Review Article

Childhood asthma - a detailed review article

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Abstract

Diagnosis of bronchial asthma in children poses great difficulty up to five years. The moment the pediatrician makes a diagnosis of bronchial asthma there is a lot of stress, anxiety and worry in the minds of parents. There are many causes of wheeze in children other than bronchial asthma. So it is difficult for the physician to make a concrete diagnosis of childhood asthma .so the author has taken a decision to review the topic in detail.
Keywords: wheeze, bronchial asthma. spirometry, broncho dilators. salbutamal, nebulisation, morbidity and mortality

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INTRODUCTION

Asthma was recognised in ancient Egypt and was treated by drinking incense mixture known as kyphi. Hiprocreates named it aspecific respiratory problem-panting in 2000b.c. the first paper in modern medicine was published in1872 stating asthma can be cured by rubbing the chest with chloroform liniment in1880. In the year 1886 i.v. use of the drug pilocarpin started. In 1886 f. h. bosworth traced the connection between asthma and hay fever. in the year 1905 the drug ephidrine was discovered and used. Oral corticosteroid was introduced in the year1950, while inhaled corticosteroids and short acting beta agonist came in to wide use in the year1960 in 19th century Mr Roosevelt suffered repeated attacks of asthma, sleep disturbances-night time asthma. Asthma was considered as one of the holy seven psychosomatic disturbance during 1930-1950.

METHODS

A detailed collection and study about childhood wheeze was done. This is presented to make awareness among physicians and paediatricians. Predisposing factors-of wheeze in children

1. In infants and young children bronchi are small and-narrow
2. This results in higher peripheral air way resistance
3. As a result diseases that affect small air way have a greater impact on total air way resistance in children
4. Infants also have less elastic recoil
5. They have fewer collateral air ways
6. This results in easier obstruction and atelectasis
7. The rib cage, trachea and bronchi are also compliant in infants and young children
8. In infants and young children the diaphragm insert horizontally, instead of obliquely in adults
9. Gastro oesophageal reflux also predisposes
10. Frequent respiratory infections both viral and bacterial
11. Congenital abnormalities are also predisposing - like tracheomalacia, laryngomalacia, laryngeal web
12. Cystic fibrosis, broncho pulmonary dysplasia ,primary ciliary dyskinesia are Also wheeze producers
13. Frequent tonsilitis and adenoiditis
14. Immunodeficiency
15. Congenital mal formation of great vessels

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Table 1:

Severity	Symptom frequency	Night time symptoms	%fev1 predicted	Fev1 variability	Saba Use
Intermittent	<=2/week	<=2/month	>=80%	<20%	<=2days/week
Mild persistent	>2/week	3-4/month	>=80%	20-30%	>2 days/week
Moderate persistent	Daily	>1/week	60-80%	>30%	Daily
Severe persistent	Continuously	Frequent(7x/week)	<60%	>30%	>=twice daily

How to differentiate the etiology and arrive at the diagnosis. Obtaining detailed history is important. Family history of allergy or asthma Suggest bronchial asthma. A family history of all ergies or eczema increases suspicion of asthma. Recent infectious illnesss in the family eg .viral upper respiratory illness, pertussis, tuberculosis suggest probable cause of wheezing. Age of onset - age at onset helps to distinguish between congenital and non congenital causes of wheezing. in infants wheezing is more likely to be caused by congenital abnormality than older children. Noisy breathing increases during sleep in infants suggest laryngo malacia. Wheeze and dyspnoea occuring during neck flexion and disappears during neck extension suggest vascular ring. Pattern of wheeze-the pattern of wheeze suggest the etiology. Episodic wheezing that is seasonal or is associated with environmental exposures is likely to be caused by asthma in children9 persistant respiratory illness with wheeze should be evaluated for cystic fibrosis, broncho pleural displasia, laryngomalacia, agamma globulinemia, and primary ciliary dyskinesia. Seasonality Some cases of wheezing are seasonal-upper and lower respiratory tract infections can cause wheezing. respiratory syncytial virus (R.S.V.) is a significiant cause of wheezing in children. Most RSV virus infections in united states occur between November and may, with peak in January and february.rsv causes most cases of bronchiolitis in children with 80% in children less than one year. Cause of wheezing in children include human metapneumo virus, which typically affects infants between December and April. Human bicavirus is a parvovirus occurs in young children hospitalised for respiratory infections. Wheezing associated with croup is more common in fall and winter. Wheezing associated with Outdoor allergen is more common between february to may. In door allergens to dust, mites and house pets like dog, cats, hens can cause wheeze round the year.15wheezing from asthma can be trigered by sudden change of weather or environment. Wheezing after feeding tracheooesophageal fistulas and laryngial cleftcauses vomiting and wheezing after feeding. These symptoms are usually cause db y gastro oesophygial reflux (gerd). Infants with gerd typically have poor weight gain and have been offered numerous milk formulas. Sudden onset Foreign body aspiration can occur any time but it is common between 8 months and four years. High air way obstruction causes coughing, gagging, choking, and wheezing. children may have recurrent symptoms or nonresolution of pneumonia as a result of atelectasis. A sudden cough and wheeze after eating in a child sugget gerd. A dry un productive cough that worsens at night can be gerd, allergies, or asthma. Obstructive sleep apnea should be considered when coughing or wheezing awakens them at night and it is associated with snoring. Sleep apnea in infants is usually a result of cranio facial anomalies, but in older children main cause is adenotonsilitis. Multiple respiratory illnesses. Recurent respiratory illness in the first year of life suggests cystic fibrosis, immunodeficiency syndromes or primary ciliary dyskinesia, steatorrhea. Failure to thrive suggest cystic fibrosis. Continuous rhinitis from birth suggest primary ciliary dyskinesia. another cause is congenital laryngo malacia Apositional changes tracheomalacia and anomalies of great vessels should be considered. When wheezing occurs in infants with positional changes. Chronically ill patients should be tested for metabolic disorders, immunodeficiency diseases and cystic fibrosis. In infants wheeze that is audible without a stethoscope and not associated with respiratory distress is usually congenital air way lesion. Skin, cardiac, ear nose and throat examination may be helpful. Clubbing cyanosis wheeze due to cariac disease. Asthma triggers

1. Primary smoking or second hand smoke
2. Infections
3. Allergens such as food, pollen, mild dust mites and pet dander
4. Exercise
5. Air pollutions and toxins
6. Weather-especially extreme changes in temperature
7. Drugs such as aspirin nsaid and beta blockers
8. Food addictives
9. Emotional stress and anxiety
10. Perfumes and fragrance
11. Acid reflux

STATISTIC

As of 2001, 235-330million people worldwide are affected by asthma. And approximately 2,50,000-3, 40,000people die per year due tothis disease. Rates vary from country to country between 1-18%.it is more common in developed than developing countries. Lower rate in Asia Eastern Europe and Africa. It is more common in lower socioeconomic group in developing

nations but in affluent groups in developed countries. Asthma is twice as common in boys than in girls. But severity is equal in both sexes. Low and middle income countries make up 80% of mortality. Asthma affects 7% of the population in U. S. and 5% in U. K. Canada, Australia and Newzealand has a rate of 14-15%

DISCUSSION

The average cost per asthma related hospital stay in U.S. for children is $ 3600 dollars, where as the asthma related hospital stay for adult is $5200 to $ 6600. Medicaid was the most frequent primary payer among children .adults 18-44years in U.S. private insurance was the second most frequent payers. hence the author has taken interest to review the article in detail. Diagnostic testing Diagnostic testing is done according to the childs age and suspected etiology. When aspecific bacterial or viralillness is suspected appropriate diagnostic tests like R,S. Virus swab, sputum and blood culture, tuberculosis testing should be done. sweat chloride test will be helpful to diagnose cystic fibrosis. when immunodeficiencyis suspected serum immuno globulin levels and complete blood count is helpful. Testing for gerdis donebyp. H. Monitoring, barium swallow or endoscopy. X-ray chest should be done in patient with unexplained, recurrent wheeze, plain x-ray can identify the congenital anomalies of the lung, parenchymal lung disease some radio opaque foreign bodies and cardiac abnormolities. X-ray taken during inspiration and expiration with comparison can give a clue to radiolucent foreign body. Collapse hyperventilation, mediastinal shift, post obstructive changes, atelectasis1) abarium swallow may detect vascular rings, esophagial. Compression. computerised tomography can identify lung nodules, lung abces, bronchiectasis, MRI can identify coplex fluid collection, soft tissue pathology such as tumour, fibrosis, post obstuctive pneumonitis. bronchoscopy should be performed if foreign body 0r, aspiration is suspected. bronchoscopy will reveal compression from endo bronchial lesions mucosal inflammation, or dynamic narrowing. Broncho alveolar lavage can help diagnose infection, hemosiderosis or aspiration. Spiro metry in children of more than five years medications

1. Short acting beta2 agonist[9] (saba) such assalbutamol (albuterol) are the first line of treatment for the asthma symptoms. They are recommended. Before exercise in those with exercise induced asthma.
2. Anticholinergic medications such as ipatropium bromide provides additional benefit, when used in combination with saba. When a child requires hospital admission ipatropium does not help over saba
3. Older less selectiveadregenic agonistic such as inhaled epinephrine have similar efficacy to saba. They are however not recomended due to cardic stimulation
4. Corticosteroids are considered most effective treatment available for longterm control. Inhaled forms such as beclomethasone are used, In sever persistant disease oral corticosteroids may be needed. .once or twice inhalation are needed depending on the severity.
5. Long acting beta – Adreno receptors (laba) such as salmetrol formetrol can improve asthma at least in adults. In children this benefit is uncertain(124,125)
6. leukotriene receptor antagonists (suchas montelukast) and zafirlukast) may be used in addition to inhaled corticosteroids also in conjunction with laba. Inchildren under five years of age, they are prefered, add on therapy after inhaled corticosteroids by the british thoracic societyin 2009
7. Arachidonate 5-lipoxygenase (5--lox) enzyme inhibitors such Aszileuton, and ST Johns worths low down or stops asthma. The asthma related leukotriens which promote inflamations, microvascular permeability, broncho constriction and mucus secretions. (14,130,134). 5-lox inhibitors posses efficacy for treating asthma both as monotherapy and as combination therapy with leukotrienereceptor antagonists
8. Mast cell stabilisears such as chromolan sodium are non-prefered to corticosteroids9 anti ig-e medicine omalizumab is given s.c. or as slow i.v. infusion twice a month (once in fifteen days) for about eighteen months. experience of this medicine in pediatric age is under study

DELIVERY METHODS

Medications are typically provided as metered dose inhaler (MDI) in combination with an asthma spacer or as dry powder inhaler. It is a plastic cylinder that mixes the medication with air making it easier to receive a full dose of the drug. anebuliser is used in chidren less than three or four years. Nebuliser and spacer are equally effective in those with moderate symptoms

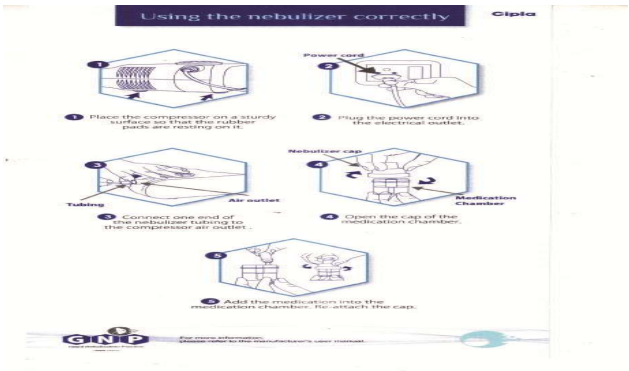

Figure 1:

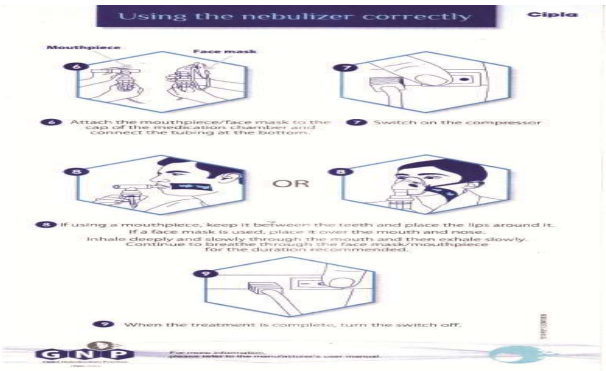

Figure 2:

Dos and donots while using nebulisation dos

- Wash your hand before using your nebulizer
- Always use a clean and dry nebulizer.
- Alwyays keep the nebulizer in up right position
- Whenever possible a mouthpiece should be preferred over a face mask
- Steady normal breathing during nebulization with occasional deep breaths is beneficial
- Occasional tapping the side of the chamber during the nebulization is better
- Rinse the mouth with water and spitout after each nebulization
- The nebulizer accessories should be cleaned regularly.
- Always follow the manufacturs instruction for cleaning and maintantenance of the nebulizer.
- Nebulizer parts should be checked regularly.
- When used by,on or near children close supervision is necessary

Donots

- Donot exceed the medication dose recommended by the physicion
- Donot use nebulizer acessories when cracked
- Donot exceed level of the drug in the medication chamber beyond 5ml, or as recommended by the manufacturer
- Donot talk during the nebulization
- Donot let the mist reach the eyes as it may cause irritation
- Donot continue the nebulization process beyond 10 minutes or as recommended by the physicion
- Donot block the air openings when the nebulizer is in use.
- Donot replace or substitute the filter with cotton or any other materials
- Donot towel dry the nebulizer parts donot place the nebulizer compressor system near any other liquid using the nebulizer correctly

Others

When asthma is unresponsive to usual medicines other options are available. Foremergency management other options include. Oxygen to alleviate hypoxia if saturation falls below 92%. Oral corticosteroids are recommended with five days of prednisolone two days of dexamethasone. Magnesium sulphate i.v. treatment has bronchodilator effect when used with other treatment include for severe asthma Heliox, amixture of helium and oxygen is useful in cases of sever unresponsive cases. i.v. salbutamol is not supported by the available evidences and used in extreme cases. Methylxanthins such as (theophyline) were once widely used. Their use in acute exacerbation is controversial. Dissociated anasthetic ketamine is theoretically useful if intubation mechanical ventilation is needed. Bronchial thermoplasty-involves delivery of controlled thermal energy to the airway during series of bronchoscopies. Sub lingual immunotherapy is usefull in those with allergic rhinitis. Acu puncture is not recommended for asthma. Air ionisers positive and negative ion generators no evidence that improve asthma Manual therapy like osteopathic, chiropractic, physiotherapy have in sufficient evidence to support their use (154) prognosis. The prognosis of asthma is generally good. Especially for children with mild diesease, diaabilityin function. Globally it causes, moderate to severdisability in 19 million of which 16 million are in low and middilie income countries. Diagnosed as asthma during childhood half of the cases are normal after a decade (55) life style modification. Avoidance of triggers is an important measure the common triggers are a Llergens, smoke-tobacco fumes, pollutions, non selective betablockerrs and sulfite containing food. Dust mite controle measures, including air filtration, chemicals to kill the mites, vaccuuming, mattress covers discussion prognosis for asthma is generally good for chidren with mild disease (156). Mortality has decreased over the last few decades due to better recognition and improvement in care globally it causes moderate or severle disability in. 4 million people in the year 2004.16 million of which are in

low and middle income countries8). Of asthma diagnosed during childhood, half of the cases are normal after a decade. Early treatment with corticosteroid seems to prevent or ameliorates a decline in lung function.

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