



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

Outstanding Medical Need In Bronchial Asthma

Aditya Gangule*, Prasad Varpe, Aher Akash

Department of Bachelor of Pharmacy Rashtrasant Janardhan Swami collage of Pharmacy Dr. Babasaheb Ambedkar Technological University Lonere, India.

ARTICLE INFO

Received: 04 July 2024

Accepted: 07 July 2024

Published: 20 July 2024

Keywords:

Bronchial Asthma,
Telemedicine.

DOI:

10.5281/zenodo.12787836

ABSTRACT

The new logical examination has given clinicians the apparatuses for significantly overhauling the norm of care in the field of bronchial asthma. In any case, palatable asthma control actually stays a neglected need around the world. Distinguishing the significant determinants of unfortunate control in various asthma seriousness levels addresses the most important move towards the improvement of the general patients' administration. The current survey plans to give an outline of the primary neglected needs in asthma control and of the expected devices for beating the issue. Executing a customized medication approach is fundamental, not just with regards to pharmacological medicines, biologic medications or modern biomarkers. As a matter of fact, investigating the perplexing profile of every patient, from his irritation aggregate to his inclinations and assumptions, may assist in filling the hole between the large capability of at present accessible medicines and the generally speaking unacceptable asthma with controlling. Telemedicine and e-wellbeing advancements might give a procedure to both improve illness appraisal consistently and upgrade patients' strengthening in dealing with their asthma. Expanding patients' mindfulness as well as the doctors' information about asthma aggregates and treatment choices other than corticosteroid likely address the key and more troublesome objectives of the multitude of players engaged with asthma the board at each level.

INTRODUCTION

Wellbeing as given by WHO (1946) is "a condition of complete physical, mental and social prosperity, not just the shortfall of sickness or illness." The capacity to make consistent and powerful mediations into individuals' wellbeing is another moral obligation too as medical services assets are

restricted and disseminated fittingly. The writing uncovers that the new clinical determinations are frequently invited as any open doors for the development of drug market. Asthma and the entanglements because of it, incredibly affect the personal satisfaction. 2 There are no particular systems and practical choices accessible to totally

*Corresponding Author: Aditya Gangule

Address: Department of Bachelor of Pharmacy Rashtrasant Janardhan Swami collage of Pharmacy Dr. Babasaheb Ambedkar Technological University Lonere, India

Email ✉: adityagangule2004@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



fix asthma so the fundamental accentuation is to control the indications of the sickness. As per late GINA (Worldwide Drive for Asthma) technique, asthma control depends on surveying the side effect control and the gamble factors related with its unfortunate result. 5 Worldwide Asthma Report 2014 announced around 334 million individuals experienced asthma and this figure was projected to heighten to 400 million constantly 2025. Asthma is accounted for as the fourteenth most significant sickness on the planet as per insights and it influences around 14%, 8.6% and 4.5% of world kids, youthful grown-ups and total populace, separately. Among the total asthma cases globally, about 5% to 10% account for severe uncontrolled asthma.9-10 The cost of direct and indirect asthma in controlled and uncontrolled asthma patients between the age group 15-64, was estimated to be €19 billion/annum.11

Asthma:

Asthma is portrayed as an ongoing obstructive fiery sickness comprising of a cell part which brings about the irritation of aviation routes and hyper-responsiveness in light of a few immediate or backhanded improvements. 12 The side effects incorporate repetitive episodes of wheezing, windedness, chest fixing and hacking, especially around evening time or in the early morning.

The wind stream constraint because of smooth muscle compressions, edema and hypersecretion, is answerable for aviation route tissue responses.

13 The different medication the board gatherings like the Public Establishments of Wellbeing (USA), the Worldwide Drive for Asthma (GINA) and the Japanese Society of Allergology (JSA) have distributed a few asthma counteraction and the executives rules. 14-18

Epidemiology:

Asthma is a typical ailment that influences 300 million individuals overall and 25 million individuals in US with that number expected to rise. 19 It is thought of as one of the costlier persistent condition, with an expected 15 million day to day changed life years (DALYs) lost yearly and results in one of each and every 250 passings around the world. The overview on illness is characterized as current episodes of wheezing or a doctor's conclusion shows that asthma as a rule influences 5-16% individuals around the world. 20 The pace of sickness changes in various nations relying on the demonstrative principles. 21

The reported expansion in asthma in most recent 25 years is because of the progressions in our way of life and climate as hereditary changes occur in years. 22 As asthma rates are expanding practically half consistently, it is viewed as the third driving reason for death by 2020 as indicated by World Wellbeing Association (WHO). The paces of asthma are higher among created nations, 23-29 the majority of individuals procure them before 10 years old while others obtain by the age of 30 (Table 1).24-28

Table 1: Prevalence Of Asthma In Different Countries

Country	Prevalence/1000
Scotland	184
U.K.	153
New Zealand	151
Australia	147
Canada	141
U.S.A.	130
Brazil	114
Pakistan	108
Turkey	74
France	68
Japan	67



Thailand	65
Germany	63
Iran	55
Nigeria	54
Malaysia	48
Italy	45
India	24
Russia	22
China	21
Macau	07

Types of Asthma: Asthma might be set off by various factors, for example, shape, dust, pets, cockroach, certain synthetic scents, smoke, grass, weeds and so on. Contingent upon the age and the variables in question, asthma can be named:

1. Childhood Asthma
2. Adult-onset Asthma
3. Exercise induced Asthma
4. Cough induced Asthma
5. Occupational Asthma
6. Nocturnal Asthma
7. Steroid resistant Asthma

Asthma may be set off by different elements, for instance, shape, dust, pets, cockroach, certain manufactured aromas, smoke, grass, weeds, etc.

Dependent upon the age and the factors being referred to, asthma can be named: A Prenatal phase 31-34

A Preschool stage 33, 35

A Stage enduring all through the lifetime 36, 37

The postnatally procured wind stream deterrent is generally found in patients with repetitive intensifications. The lung capability impedance is likewise connected with word related asthma and openness to air contamination. 38, 39 A few youngsters show just gentle, transient and inconsistent episodes of aviation route obstacle that doesn't prompt constant asthma. Contingent on the seriousness of asthmatic episodes, it tends to be additionally delegated in Table 2.

Table 2: Classification Of Asthma

Classification of Asthma	
Mild Intermittent	Attacks not more than twice a week and night time attacks not more than twice a month. Attacks last for few hours and severity of attack varies.
Mild Persistent	Attacks more than twice a week and night time symptoms more than twice a month. Sometimes attacks are severe enough to interrupt regular activities.
Moderate Persistent	Daily attacks, Night time symptoms more than once in a week. Severe attacks at least twice a week lasting for days. Attacks require daily use of rescue medication and changes in daily activities.
Severe Persistent	Frequent severe attacks, continual daytime symptoms and frequent night time symptoms. Symptoms require limits on daily activity.

Signs and Symptoms: The powerlessness to asthma is by all accounts related with microbial

colonization of aviation routes. The babies who have been distinguished with expanded measures

of pathogenic microorganisms in upper aviation routes, found to foster side effects of asthma in preschool years. 40 The different signs and side effects related with asthmatic assaults are:

Coughing, especially at night, during exercise and laughing Wheezing (whistling or squeaky sound in chest while breathing, especially when exhaling) Shortness of breath Tightness in chest Pain and pressure in chest The side effects of asthma might be set off by openness to specific allergens, for example, weeds, dust, pets, dust, bugs and so on or because of the presence of certain aggravations in air like smoke, synthetic aggravations or certain smells or because of a few outrageous weather patterns or the presence of sulfites in specific food stuffs. Certain circumstances like respiratory disease, exercise and influenza makes an individual more helpless to asthmatic assault. A solid showcase of specific feelings like yelling, crying, snickering may at some point additionally contributes towards asthmatic assault. The scientists have found that breathing example related areas of strength for with can prompt the choking of bronchial cylinders, inciting or deteriorating of an assault. Asthma, as other persistent circumstances lead to profound pressure. The powerlessness to work and school nonattendances influences the business, instructive and close to home prosperity, bringing about sadness.

All of the asthmatic patients don't show recently referenced aftereffects and nearly, the presence of above secondary effects doesn't exhibits that an individual is encountering asthma. The finding of asthma is done by the clinical history of individual, genuine evaluation, lung capacity test and positive methacholine challenge test.

Pathophysiology of Asthma:

Cells and Cytokines: Bronchial Asthma (BA) is an ordinary ominously vulnerable disease and the instrument included is being looked extensively. The previous examinations assumed that asthma is

T-helper type-2 (Th2)- cell subordinate IgE mediated horribly powerless sickness as most of asthmatics are fragile to aeroallergens. The depiction of masochist reason of asthma consolidates organic liquid cell hyperplasia and attack of combustible cells that integrates CD4+ Lymphocytes, eosinophils and post cells. The dated model of asthma is a staggering snare of cells and the telephone hailing particles speak with each other to get a provocative response. The Allergen/Antigen show by antigen presenting cells (APC) to T-accomplice type-0 cells (Th0) prompts the detachment of Th2 cells. The antigen energy achieves the production of thymic stromal lymphopoietin (TSLP) in the epithelial cells of flying courses. TSLP circles back to its receptors (TSLPR) which are conveyed by dendritic cells (DCs) and advances the record of Bull 40L, a person from TNF (Development Decay Variable) gathering of cytokines. Bull 40L by the help of ordered DCs prompts explanation of Th2 cytokines achieving partition of provocative Th2 cells. 42 The provocative Th2 cells then, produce various kinds of cytokines as IL-4, IL-5 and IL-13. These cytokines institute B-cells achieving the mix and appearance. The took in allergens bind to the receptors present on the external layer of shaft cells where IgE furthermore binds to convey different red hot referees like receptor, prostaglandin and leukotrienes by degranulation. These substance provocative center individuals goes about as cell hailing particles to incite bronchoconstriction of smooth muscles, flying course snag and further multiplies the red hot response (Fig. 1). Th2 lymphocytes also produce another class of cytokines, IL-9 which in like manner quickens the development of shaft cells in aeronautics highways 43 and IL-5 which is connected with the perseverance of eosinophils. 44 Eosinophils moreover participate in the searing cycle by conveying the provocative substance go between like Leukotrienes and Responsive



Oxygen Species (ROS) achieving bronchoconstriction, mucous outflow and essential damage to flight courses. 45-48 The patients with Th2 cytokines and eosinophil ruling

asthma answers well to Took in Corticosteroids (ICS). The ones with high eosinophil-power are open to treatment with threatening to IL-5 resistant reaction.

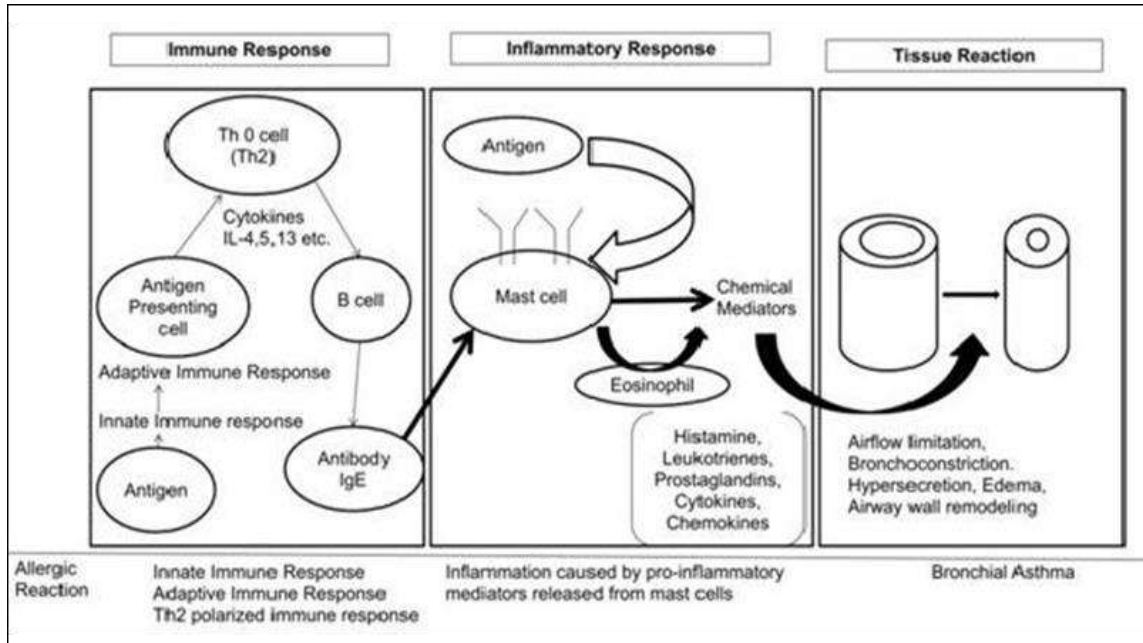


Fig. 1: Process Of Allergic Asthma

Alongside Th2 cytokines and eosinophils, asthma is additionally connected with neutrophil-dominating Th17 related sickness as Th17 and it is related IL-17 cytokines likewise assume huge part in aviation route irritation. The introduction of antigen introducing cells (APC) by IL-23 outcomes in the separation of Th17 cytokines. The declaration of IL-17 by Th17 cells expands in vitro glucocorticoid beta (GR-β) articulation by epithelial cells of aviation routes. GR-β acts by the serious hindrance of GR-α intervened calming quality record at glucocorticoid reaction component (GRE).⁴⁹ IL-17 aides in the enlistment of neutrophils by setting IL-8 free from epithelial cells of aviation routes and is additionally an activator of endothelial cells to advance immigration of neutrophils at the site of inflammation.⁵⁰ Aviation route neutrophils produces different lipid middle people like elastase, leukotriene-B4 and grid metalloproteinase-9 (MMP-9) and platelet enacting factors (PAF), all of which further

proliferates the course of irritation and furthermore enrolls eosinophils. ⁵¹ Aviation route epithelial cells likewise discharge IL-5 and a foundational microorganism factor (SCF), a cytokine supporting the endurance of pole cell inside aviation routes, and a macrophage chemo-attractant protein-1 (MCP-1). MCP-1 additionally selects alveolar macrophages subsequently improving the provocative cycle. On restricting of allergen to IgE receptors, these macrophages discharge specific cytokines, for example, IL-1β, TNF-α and IL-6 and elastase (corrupt elastin in aviation route extracellular grid) and metalloproteinase. ^{52, 53} These cytokines further subsequent on epithelial cells and conveyances Granulocyte-macrophage state fortifying part (GM-CSF), IL-8 and coordinated on incitation, normal Insusceptible framework microorganisms imparted and discharged (RANTES). GM-CSF and RANTES starts eosinophils and advance their perseverance in airways.^{54, 55} One oxidative pressure control development, enactment,

enlistment and capability of these myeloid cells. The differential guideline by NO (nitric oxide) produces juvenile myeloid cells which gives their commitment yet to be determined of insusceptible

concealment and compounding of the hyper-responsiveness of aviation routes (Fig. 2).⁵⁶

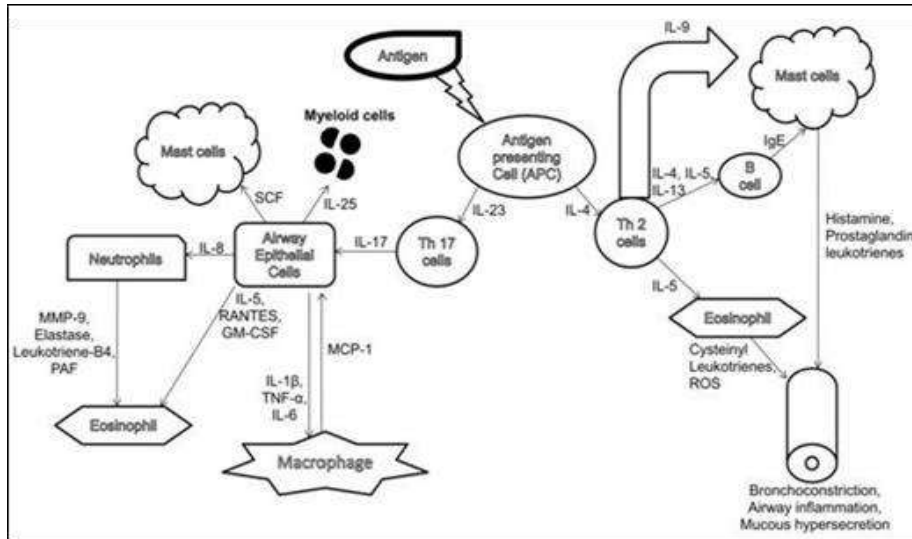


Fig. 2: Mechanism Of Asthma

Airway Remodelling: Irritation results into various primary changes in aviation routes including the thickening of cellular layer, subepithelial fibrosis, metaplasia of cup cells, neovascularization and expanded smooth bulk of aviation routes. All asthmatic patients experience serious impacts on the design and capability of aviation routes, no matter what the length of infection. Aviation route rebuilding is normally connected with an irreversible abatement in constrained expiratory volume (FEV1), expansion in the hyper-responsiveness of aviation routes, expansion in the thickness of cellular layer of aviation routes and loss of bronchodilator reversibility.^{57, 58}

Moreover, this large number of primary changes in the aviation routes of asthmatics help in the turn of events and movement of sickness. It is hazy whether the irritation goes before or exists together with aviation route renovating however rebuilding can happen right off the bat in the illness even without a trace of aggravation. There is an immediate connection between mechanical

pressure and aviation route rebuilding in asthma.⁵⁹

Methods for the treatment of asthma: The past examinations about the pathophysiology of asthma proposes different accessible focuses on whose enactment or bar will be useful to treat asthma. The different accessible methodologies are:

Prevention of antigen-antibody reaction:

Antigen avoidance, hypo sensitization

Neutralization of IgE (reaginic antibody):

Omalizumab

Prevention of the release of mediators: Mast cell stabilizers

Suppression of inflammation and bronchial hyper-reactivity: Corticosteroids

Antagonism of released mediators: Leukotriene antagonist, Antihistamines, PAF antagonists.

Blockade of constrictor neurotransmitter:

Anticholinergics

Mimicking dilator neurotransmitter:

Sympathomimetics

Directly acting bronchodilators:

Methylxanthines

Adenosine modulators: In light of above draws near, antiasthmatics can be characterized pharmacologically into different classes, comprehensively as bronchodilators and corticosteroids which can be arranged further. The substance designs of different antiasthmatic drugs accessible in market are given in Fig. 3

Bronchodilators:

1. β 2-sympathomimetics (Salbutamol, Terbutaline, Bambutarol, Salmeterol, Formoterol, Ephedrine)
2. Methylxanthines (Theophylline, Aminophylline, Choline theophyllinate, Hydroxyethyl theophylline, Doxophylline)

3. Anticholinergics (Ipratropium bromide, Tiotropium bromide)

Leukotriene Antagonist (Montelukast, Zafirlukast)

Mast cell stabilizers (Sodium Cromoglycate, Ketotifen)

Corticosteroids:

1. Systemic Corticosteroids (Hydrocortisone, Prednisolone)

2. Inhalational Corticosteroids (Beclomethasone, Budesonide, Fluticasone propionate, Flunisolide, Ciclesonide)

Anti IgE antibody (Omalizumab)

Miscellaneous drugs (Prostaglandins, Antihistamines, Adrenocorticotrophic hormone)

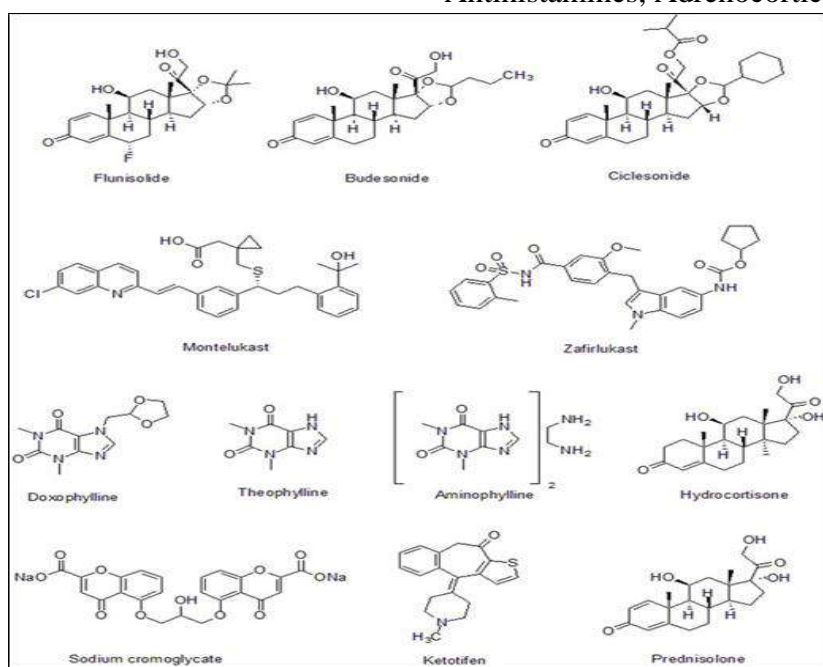


Fig. 3: Various Antiasthmatic Drugs

RESULTS AND DISCUSSION: There is no methodology to forestall essential asthma and to forestall the constraint of wind current in asthmatics. The aversion of allergens in any event, during pregnancy and early earliest stages significantly affects results of asthma. The two significant perspectives to treat asthma are: Natural Control and Pharmacological Treatment. The immature nations face inconveniences as far as under determination, accessibility and

reasonableness to treatment which thus is related with expanded pace of mortality and dreariness related with asthma and requires broad consideration. The super causative specialist is natural openness yet the treatment as far as allergen evasion is disputable. The pharmacological treatment incorporates the utilization of breathed in corticosteroids regardless of long acting beta agonists, leukotriene receptor bad guys, hostile to IgE neutralizer, antibodies

against chemokines and cytokines, phosphodiesterase inhibitors, allergy meds and thermoplasty. α -adrenoceptor blockers diminishes receptor actuated bronchoconstriction yet they likewise have antihistaminic movement or direct smooth muscle loosening up action so the specific perception is difficult to decipher. The β -adrenoceptor feeling of bronchial muscles discharges bronchial fit and hinders the freedom of provocative arbiters. Xanthines act by hindering the catalyst phosphodiesterase (PDE) bringing about bronchodilation by loosening up the smooth muscles. Consequently, there is a requirement for the presentation of novel treatments which are focused on explicitly against parts of incendiary pathway. The three significant methodologies for the advancement of more current enemy of asthmatic medications are: improvement of existing class of successful medications (ICs and LABAs yet make fundamental side impacts), improvement of novel mixtures and luck improvement. The counter sensitivity sedates additionally goes about as one more way to deal with hinder allergen instigated illnesses.

CONCLUSION: Right now, various methodologies are accessible for asthma yet from recent years just couple of medications can advance till market. Hence, there is a need to see totally the specific aggregate of asthmatic patients with the goal that every patient will get legitimate treatment and furthermore expand the pathway for the improvement of more up to date sedates. Various locales or receptors are associated with the movement of sickness so the total comprehension of every receptor and the system included will give a reasonable view about the treatment to be followed whether alone or in blend with at least one class of medications. Consequently, there is a need to widen the area of exploration and to zero in on other possible restorative specialists for the treatment of asthma which gives suggestive help as well as fix the

illness. The expanded information and complete comprehension of the infection will ideally prompt even more compelling solutions for asthma. The current interest is to spread the information on existing remedial potential outcomes.

CONFLICT OF INTEREST: Authors have no conflict of interest.

ACKNOWLEDGEMENT: Thanks to the authors cited and my colleagues for their suppo

REFERENCE

1. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2014.
2. Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C and Bridgett L: Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet* 2013; 380: 2197-2223.
3. To T, Stanojevic S, Moores G, Gershon AS, Bateman ED, Cruz AA and Boulet LP: Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC Public Health* 2012; 12: 204-208.
4. Cassels A and Welch G: *Seeking Sickness: Medical Screening and the Misguided Hunt for Disease*. Greystone Books, 2012.
5. Pereira ED, Cavalcante AG, Pereira EN, Lucas P and Holanda MA: Asthma control and quality of life in patients with moderate or severe asthma. *Brazilian Journal of Pulmonology* 2011; 37: 705–711.
6. Bateman ED, Hurd SS and Barnes PJ: Global strategy for asthma management and prevention: GINA executive summary. *European Respiratory Journal* 2016; 31: 143–78.
7. Chung KF, Wenzel SE, Bronzek JL, Bush A, Castro M, Sterk PJ, Adcock IM, Bateman ED, Bel EH, Bleecker ER, Boulet LP, Brightling C, Chanez P, Dahlen SE, Djukanovic R, Frey U, Gaga M, Gibson P, Hamid Q, Jajour NN,



- Mauad T, Sorkness RL and Teague WG: International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *European Respiratory Journal* 2014; 43: 343-373.
8. Global Asthma Report (2014). Auckland, New Zealand: Global Asthma Network, 2014.
 9. Al-Hajjaj MS: Difficult-to-treat asthma, Is it really difficult? *Annals of Thoracic Medicine* 2011; 6: 1-6.
 10. Dheda K, Koegelenberg CFN, Esmail A, Irusen E, Wechsler ME, Niven RM and Chung KF: Recommendations for the use of bronchial thermoplasty in the management of severe asthma. *South African Medical Journal* 2015; 105: 726-732.
 11. Domínguez-Ortega J, Phillips-Anglés E, Barranco P and Quirce S: Cost effectiveness of asthma therapy: A comprehensive review. *Journal of Asthma* 2015; 52: 529-537.
 12. Trevor JL and Deshane JS: Refractory asthma: mechanisms, targets, and therapy. *Allergy* 2014; 69: 817-827.
 13. Nagai H: Recent research and development strategy of anti-asthma drugs. *Pharmacology and Therapeutics* 2012; 133: 70-78.
 14. O'Byrne PM: Global guidelines for asthma management: summary of the current status and future challenges. *Polish Archives of Internal Medicine* 2010; 120: 511-517.
 15. Hoeksema LJ, Bazy A, Lemotan EA, Edmonds DE, Ramirez-Garnica G and Shiffman RN: Accuracy of a computerized clinical decision-support system for asthma assessment and management. *Journal of American Medical Informatics Association* 2011; 18: 243-250.
 16. Dahlén SE, Dahlén B and Drazen JM: Asthma treatment guidelines meet the real world. *The New England Journal of Medicine* 2011; 364: 1769-1770.
 17. Ohta K, Yamaguchi M, Akiyama K, Adachi M, Ichinose M and Takahashi K: Japanese guideline for adult asthma. *Allergology International* 2011; 60: 115-145.
 18. To T, Stanojevic S, Moores G, Gershon AS, Bateman ED, Cruz AA and Boulet LP: Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC Public Health* 2012; 12: 204.
 19. Akinbami LJ, Moorman JE and Bailey C: Trends in asthma prevalence, health care use, and mortality in the United States, 2001-2010. Hyattsville, MD, USA: National Center for Health Statistics, 2012.
 20. Asher MI, Montefort S and Bjorksten, B: Worldwide time trends in the prevalence of symptoms of asthma, allergic rhino conjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multicountry cross-sectional surveys. *Lancet* 2006; 368: 733-743.
 21. Covar RA, Strunk R and Zeiger RS: Predictors of remitting, periodic, and persistent childhood asthma. *Journal of Allergy and Clinical Immunology* 2010; 125: 359-366.
 22. Ichinose M: Differences of Inflammatory mechanisms in Asthma and COPD. *Allergology International* 2009; 58: 307-313.
 23. Ko YA, Song PXX and Clark NM: Declines With Age in Childhood Asthma Symptoms and Health Care Use. *Health Education and Behavior* 2014; 41: 539-549.
 24. Tagiyeva N, Devereux G, Fielding S, Turner S and Douglas G: Outcomes of Childhood Asthma and Wheezy Bronchitis. A 50-Year Cohort Study. *American Journal of Respiratory and Critical Care Medicine* 2016; 193: 23-30.
 25. Chan JYC, Stern DA, Guerra S, Wright AL, Morgan WJ and Martinez FD: Pneumonia in Childhood and Impaired Lung Function in

- Adults: A Longitudinal Study. *Pediatrics* 2015; 135: 607-616.
26. Bisgaard H, Jensen SM and Bonnelykke K: Interaction between asthma and lung function growth in early life. *American Journal of Respiratory and Critical Care Medicine* 2012; 185: 1183–1189.
 27. Mullane D, Turner SW and Cox DW: Reduced Infant Lung Function, Active Smoking, and Wheeze in 18-Year- Old Individuals. *JAMA Pediatrics* 2013; 167: 368-373.
 28. Bernstein JA and Levy ML: *Clinical Asthma: Theory and Practice*. CRC Press, Taylor and Francis Group, New York, 2014.
 29. Tai A: *Strengths, Pitfalls, and Lessons from Longitudinal Childhood Asthma Cohorts of Children Followed Up into Adult life*. BioMed Research International 2016; 2016:1-8.
 30. Haland G, Carlsen KC and Sandvik L: Reduced lung function at birth and the risk of asthma at 10 years of age. *The New England Journal of Medicine* 2006; 355: 1682–1689.
 31. Stern DA, Morgan WJ, Wright AL, Guerra S and Martinez FD: Poor airway function in early infancy and lung function by age 22 years: a non-selective longitudinal cohort study. *Lancet* 2007; 370: 758–764.
 32. Bisgaard H, Jensen SM and Bonnelykke K. Interaction between asthma and lung function growth in early life. *American Journal of Respiratory and Critical Care Medicine* 2012; 185: 1183–1189.
 33. Turner SW, Palmer LJ and Rye PJ: The relationship between infant airway function, childhood airway responsiveness, and asthma. *American Journal of Respiratory and Critical Care Medicine* 2004; 169: 921–927.
 34. Morgan WJ, Stern DA and Sherrill DL: Outcome of asthma and wheezing in the first 6 years of life: follow-up through adolescence. *American Journal of Respiratory and Critical Care Medicine* 2005; 172: 1253–125
 35. Strunk RC, Weiss ST, Yates KP, Tonascia J, Zeiger RS and Szeffler SJ: Mild to moderate asthma affects lung growth in children and adolescents. *Journal of Allergy and Clinical Immunology* 2006; 118: 1040–1047.
 36. James AL, Palmer LJ and Kicic E: Decline in lung function in the Busselton Health Study: the effects of asthma and cigarette smoking. *American Journal of Respiratory and Critical Care Medicine* 2005; 171: 109–114.
 37. Mortimer K, Neugebauer R, Lurmann F, Alcorn S, Balmes J and Tager I: Air pollution and pulmonary function in asthmatic children: effects of prenatal and lifetime exposures. *Epidemiology* 2008; 19: 550–557.
 38. Anees W, Moore VC and Burge PS: FEV1 decline in occupational asthma. *Thorax* 2006; 61: 751–755.
 39. Bisgaard H, Hermansen MN and Buchvald F: Childhood asthma after bacterial colonization of the airway in neonates. *The New England Journal of Medicine* 2007; 357: 1487–1495.
 40. Burrows B, Martinez FD, Halonen M, Barbee RA and Cline MG: Association of asthma with serum IgE levels and skin test reactivity to allergens. *The New England Journal of Medicine* 1989; 320: 271–277.
 41. Liu YJ: Thymic stromal lymphopoietin and OX40 ligand pathway in the initiation of dendritic cell-mediated allergic inflammation. *Journal of Allergy and Clinical Immunology* 2007; 120: 238–244.
 42. Barnes PJ: The cytokine network in asthma and chronic obstructive pulmonary disease. *The Journal of Clinical Investigation* 2008; 118: 3546–3556.
 43. Adcock IM and Caramori G: Cross-talk between pro-inflammatory transcription

- factors and glucocorticoids. *Immunology and Cell Biology* 2001; 79: 376–384.
43. Gleich GJ: Mechanisms of eosinophil-associated inflammation. *Journal of Allergy and Clinical Immunology* 2000; 105: 651–663.
44. Porsbjerg CM, Gibson PG, Pretto JJ, Salome CM, Brown NJ and Berend N: Relationship between airway pathophysiology and airway inflammation in older asthmatics. *Respirology* 2013; 18: 1128–1134.
45. Niimi A: Cough, asthma and cysteinyl leukotrienes. *Pulmonary Pharmacology and Therapeutics* 2013; 2: 514–519.
46. Annema JT, Sparrow D, O'Connor GT, Rijcken B, Koeter GH and Postma DS: Chronic respiratory symptoms and airway responsiveness to methacholine are associated with eosinophilia in older men: the Normative Aging Study. *European Respiratory Journal* 1995; 8: 62–69.
47. Vazquez-Tello A, Halwani R, Hamid Q and Al-Muhsen S: Glucocorticoid receptor-beta up-regulation and steroid resistance induction by IL-17 and IL-23 cytokine stimulation in peripheral mononuclear cells. *Journal of Clinical Immunology* 2013; 33: 466–478.
48. Roussel L, Houle F, Chan C, Yao Y, Berube J and Olivenstein R: IL-17 promotes p38 MAPK-dependent endothelial activation enhancing neutrophil recruitment to sites of inflammation. *Journal of Immunology* 2010; 184: 4531–4537.
49. Nakagome K, Matsushita S and Nagata M: Neutrophilic inflammation in severe asthma. *International Archives of Allergy and Immunology* 2012; 15: 96–102.
50. Bousquet J, Chanez P, Lacoste JY, White R, Vic P and Godard P: Asthma: a disease remodeling the airways. *Allergy* 1992; 47: 3–11.
51. Zar HJ and Levin ME: Challenges in treating pediatric asthma in developing countries. *Paediatric Drugs* 2012; 14: 353–359.

HOW TO CITE: Aditya Gangule*, Prasad Varpe, Aher Akash, Outstanding Medical Need In Bronchial Asthma, *Int. J. of Pharm. Sci.*, 2024, Vol 2, Issue 7, 1465-1475. <https://doi.org/10.5281/zenodo.12787836>

