



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3725807>Available online at: <http://www.iajps.com>

Review Article

**PREVALENCE OF ASTHMA AND ITS MANAGEMENT:
A REVIEW STUDY**¹Dr. Zaid Aslam, ²Dr. Amara Sarwar, ³Dr. Ali Umair^{1,2,3}MBBS; Mohi-Ud-Din Islamic Medical College Mirpur AJK, Pakistan**Article Received:** January 2020 **Accepted:** February 2020 **Published:** March 2020**Abstract:**

Asthma is one of common chronic disease in the USA. While asthma prevalence is closely correlated with socioeconomic and environmental factors than geographic location or population density. In many respiratory problems, asthma is one of the fast spreading illness which has encountered about 1/3rd of the world's population. Due to drug related issues, the patients of asthma abandon to get maximum benefits from the treatment many times. The current study was proposed to highlight the most common problems of asthmatic patients and their possible interventions suggested during the last few years. Adherence to medication along with proper inhalation technique is the biggest challenge among asthmatic patients. Proper counselling, training sessions, dosage calendars, patient reminders and assessment of inhalation technique are found to be beneficial in improving and maintain the quality of life of patients, according to Global Initiative for Asthma Guidelines 2017.

Corresponding author:**Dr. Zaid Aslam,**

Mohi-Ud-Din Islamic Medical College Mirpur AJK, Pakistan

QR code



Please cite this article in press Zaid Aslam et al., *Prevalence of asthma and its management: A review study*, Indo Am. J. P. Sci, 2020; 07(03).

INTRODUCTION:

Asthma is one of the common chronic disease of children and adolescents in the USA. It is an inflammatory disorder of the airways characterizing bronchial hyper responsiveness, mucosal edema, and restriction of airway (1). Clinically, asthma happens by chest tightness episodically, shortness of breath, cough, and wheeze. These symptoms are usually reversible with proper medical treatment. Symptoms of asthma not only vary from patient to patient, but exacerbation to exacerbation in the same patient (2). Commonly observed heterogeneous phenotypes include allergic, non-allergic, delayed onset, asthma with fixed airflow restriction and asthma with obesity (3).

Asthma is a predominant health complication for children, adolescents and their families with management challenges needing adequate interventions. In this review, we explore the prevalence of asthma and follow with an overview of rare asthma triggers, obstacles to healthcare access, and interventions with positive results. We deduce with recommendations for future research.

Prevalence:

The hyper-reactiveness of respiratory tract, asthma, is considered as the critical medical condition globally. From different countries, about 1-18% of population suffers from asthma (4). The World Health Organisation (WHO) fact sheet disclosed that among the world population around 235 million people are suffered by asthma (5). It does not get hampered by the levels of structural and economic development of the country and is considered as a public health problem. It produces burden on family, society and country by remaining undiagnosed, untreated, and disordering all the activities of its sufferer (6). After consideration of the increasing prevalence of asthma, Global Initiative for Asthma (GINA), decided to highlight global awareness about asthma but also to regularly update the guidelines of the treatment (7). The seriousness of condition can be visualized by the death rate of asthmatic patients during and after intense progression of asthmatic attacks which were preventable up to some extent, but ended up with lack of ininitial provision of emergency medical care (8). Almost 250,000 annual deaths of asthmatic patients were estimated by WHO. During the 21st century, medical improvements in the field of asthma prevention enhanced at exponential rates but the number of people suffering from this respiratory misery have also increased, although the death rate had decreased compared to the last century (9). The administration of the inhaled corticosteroid medication along with short and long-acting beta

agonist assisting in improving asthma control and decreased the intensity as well. (10).

Typically, asthma is characterized by variables such as location, gender, race/ethnicity, socio-economic status, and change over time; group differentiation support our understanding of asthma burden. From 2001 to 2009, national data revealed an increasing trend in pediatric asthma prevalence, and after up gradation, the rate began to remarkably decrease to 8.3% in 2013 (11).

However, variables do not happen in isolation. The categories of poverty, racial/ethnic minority status, and healthcare access barriers, knowingly to be related with the increased risk of asthma, sub-optimal management, and poorer results, are suffered by both rural and urban children equally. However, the most common factors experienced by children within those classifications justify furthermore investigations (12).

Social and Cultural Beliefs:

Another Drug-Related issue is of unsuitable dosages which patients increase or decrease by themselves either due to side-effects or beliefs and interests coupled to the drugs and inhalation devices advised to them. 60-70% of the asthma patients failed to take medications, reported by Barnes et al, including steroids, as advised to them by their healthcare providers. Few sufferers were found to have belief that the device they are using will turn on crucial side-effects and few feel shame by taking inhalation devices in front of people (13).

On contrary, the relatives and other people neighbouring the asthmatic patients were restricted to meet or live nearby because they perceive that the sufferer has some contagious illness that could transmit from person to person. This governs to the need of betterment, justification or modification the beliefs and concerns of the patients so that the attitude of patients about the dose of the drug and devices can be transformed (14). The factors related with mismanagement can be device-related, patient-related, cultural concerns connected with patients and their relatives and even related to healthcare professional (15).

Risk factors and triggers of Asthma:

The triggers of asthma are studied and investigated broadly, such as allergies, airway constriction/inflammation, infections, pollens, air pollution, exercise, strenuous physical activity and emotional breakdown which can be limited up to some extent. It is a need of hour to recognize and investigate the biomarkers which may reveal about pleading factors of asthma so that the start of illness can be controlled and pressure of asthma on world could be decreased (16).

The most important framework in the treatment of asthma is understanding the trigger factors which may manipulate the attack or produce respiratory problems. These risk factors have two grades i.e., life-threatening i.e. fatal, and manageable or nonfatal. This classification includes airborne virus, pollens, fungus, smoke, dirt, flu germs, thunderstorms, exercise, depression, strenuous physical activity, anxiety, emotional stress and many more.

Even the list of the trigger factors is so large that they are difficult to categorize and control. The poor control on the manageable risk factors is due to lack of knowledge to the patient (17).

The micro-environment risk factors of asthma comprise of the person's immediate environment, which involves particular asthma triggers intrinsic to that set up (18). For rural children and adolescents, housing factors and cigarette smoking are particularly problematic.

The patient's quality of living is directly connected to asthma results—environmental control measures (e.g., pest removal, air filtration, carpet removal) are part of a diverse approach to asthma management (19). More than two thirds of young rural families (head of household younger than age 35) live in rental housing. Together with the lack of rural rental units and the increased probability of limited economic resources, families with children may have much more problem finding affordable quality housing options. Not only do these scenarios increase the chance of living with asthma triggers, but renters are less able to alleviate these environmental exposures (20).

Urban people mostly live in multi-unit housing, which is related with cockroach, rodent, and dust mite allergen exposure; those with asthma often shows sensitivity to these allergens. However, rural population with asthma also demonstrate presentation and sensitization, and it is unclear if this sensitivity and succeeding asthma progression is dose-dependent. One study in the rural Arkansas Delta found that even though the majority of child participants with asthma lived in single-family dwellings, most of the homes had cockroach and mouse allergens, albeit at lower concentrations than seen in urban homes (21).

Tobacco smoking is not only highly prevalent among rural inhabitants, but rural smokers are more probable to smoke 15 or more cigarettes daily. A study showed that rural children are more prevalent to live in a home with a smoker (35 vs. 24% living in urban homes) and to be exposed to second hand smoke in cars; this exposure predominantly raises ED utilization, and two times

increases the odds of hospitalization for children with asthma (22).

Clinical Presentation and Diagnosis:

The clinical presentation of asthma usually includes dyspnea, tachycardia, clear wheezing sounds in breathing and other allergic symptoms. Due to strong genetic evidences family history of the asthmatic patient about asthma, allergies or hypersensitivity is critical in ruling out asthma. Asthma diagnosis can be done by considering duration, frequency, intensity of exacerbation, frequency of using reliever medications for asthma (23). X-ray findings Spirometer and meth choline challenge test are significant landmarks for diagnosis. Allergies, obesity, smoking, pollution and poverty were the predisposing factors for asthma (24).

Medications:

Acute symptoms treatment is initialised with oral corticosteroids and short acting beta 2-agonist. In critical exacerbation, intravenous (IV) therapy and magnesium sulfate or hospitalisation is considered. Then long-acting beta2-agonists or leukotriene antagonists are administered in addition to inhaled corticosteroids (25). Asthma is sometimes found to be overlapped with chronic obstructive pulmonary disease (COPD) treated with triple regimen of drugs including a combination of corticosteroids (inhaled), long acting beta2-agonists and long-acting muscarinic antagonists.

Some countries already have this combined form, while some use these three agents as separate inhalers. If started early enough after discharge from post exacerbation hospitalisation, controller medications can give long-lasting effects on patients in terms of adherence to these medicines and can alleviate hospital readmissions (26).

When inhaled corticosteroids and long-acting beta2-agonists used combined, are beneficial in the treatment of asthma and are not associated with adverse side effects and exacerbation frequencies compared to administration of either of them alone (27).

Inhalation is the most common route of administration of drugs used for asthma treatment because this route targets directly the affected part of the body and saves the rest from the systemic adverse effects of the steroid-containing drugs, thus making the prescription of medicines very crucial as it need specialised devices for the drug delivery to the lungs.

Dry powder inhalation devices and pressurised metered dose inhalation devices are all available in market and are prescribed very frequently to

asthmatic patients. Important measures in the up gradation of the plan of care for the asthmatic patients is the choice of the device that should be done by the critical analysis of the patients, its disease states, level of the alveolar constriction in the lungs of the patients and their ability to follow the regimen as prescribed. Many researches showed that patients using inhalers make mistakes in the administration of medicines, making the therapy compromised (28).

Asthmatic patients usually depend on inhalation devices for the administration of their medicines. In this way, the best outcomes of the therapy becomes dependent on proper use of the device, training and education are needed in this matter. There are many inhalation devices that are frequently available in the market with difference in their usage technique. Each device demands different set of steps to perform properly. These specifications, linked with each device, create chances of errors and at the same time provide facilities for the pharmacists for improvement in the use of these devices (29).

Interventions to improve outcomes:

Text messages, calls, alarms, are considered to have subsequent benefits for better compliance. In this regard, there is less documented results of giving better patient outcomes. The irregularity of these interventions affects badly in getting long-term effects on patients compliance (30). Many educational programmes and training sessions were projected in many healthcare settings, in order to improve the quality of life of asthma victims, but these programmes lost their spirit due to irregularity and discontinuity. Barriers between patients and these services is another factor of failure, such as time, distance, expense, lack of interest of patients or programmers etc. Current situation demands that such education should be made reliable, critically assessed and planned, and their regularity must be the first priority (31).

To have a complete picture of medical condition, there should be a need of recording of the symptoms on a daily basis, as asthmatic patients suffer a lot due their respiratory problems. If it happens, the physician will be better able to control patient's problems according to conditions, timetable of medication, and daily activities seemed to be very useful in this regard, producing the points at which proper and required important step should be considered as to improve patient's quality of life. And, above all, it will give facilities to integrate medicines and precautionary steps in daily routine of asthmatic patients (32).

In Germany, researchers searched the role of videos showing the proper use of inhalation devices in order to improve inappropriate administration of

drugs with these devices and found them to be a helping tool to alleviate errors in the use of these devices (33).

A new approach advice that the use of recombinant mono-clonal antibodies, like omalizumab along with beta agonists and corticosteroids, is found to be effective in alleviating exacerbation frequencies (34).

Patients given with written pamphlets for knowing their condition and plans of care were less improved as compared to the patients who were subjected with visual and electronic aids. A research involved daily text reminder for the patients to better commitment to medication of asthma for achieving the goal of therapy. When control and intervention groups were compared, the patients who were receiving daily text message alerts were leading better quality of life as compared to their counterparts in the other group. So it can be deducted that the effect of daily reminders for increasing patient's adherence cannot be neglected (35).

Repetitive reminders, evaluation of the techniques and multiple follow-up with one trusted healthcare setting are found to be satisfactory in gaining best of the best selected medicine. A good therapy can do nothing if not administered properly.

Pharmacists, have to play their role in developing the treatment of asthmatic patients. When they do so, it produces better outcomes of intervention but the difference is significant only when combined with lifestyle modifications (36). Reminder programmes for improving patient attitudes regarding compliance, if continued, are thought to have better impact in removing hurdles among patients and their therapy in the long run.

CONCLUSION:

Inhaled drugs are considered an important pillar in the development of a plan of care for an asthma patient. Common issues of asthmatic patients are related to adherence, adverse effects and special technique required for the administration of drugs. The choice of drug and device must be made after critical assessment of patients individually. Pharmacists are the last contact of the patients with any healthcare professional and play the final checkpoint role where the limited counselling and training can be identified and resolved. Studies provide proofs that if proper training, adherence and counselling aids are included in the patients care plan, the best-suited therapy will produce better quality of life for asthmatic patients.

REFERENCES:

- 1- Loss GJ, Depner M, Hose AJ, Genuneit J, Karvonen AM, Hyvärinen A, et al. The early development of wheeze. Environmental determinants and genetic susceptibility at 17q21. *Am J Respir Crit Care Med*. 2015;193(8):889–97. doi:10.1164/rccm.201507-1493OC.
- 2- Brick T, Schober Y, Böcking C, Pekkanen J, Genuneit J, Loss G, et al. ω -3 fatty acids contribute to the asthma-protective effect of unprocessed cow's milk. *J Allergy Clin Immunol*. 2016;137(6): 1699–706.e13. doi:10.1016/j.jaci.2015.10.042.
- 3- Lluís A, Depner M, Gaugler B, Saas P, Casaca VI, Raedler D, et al. Increased regulatory T-cell numbers are associated with farm milk exposure and lower atopic sensitization and asthma in childhood. *J Allergy Clin Immunol*. 2014;133(2):551–9.e10. doi:10.1016/j.jaci.2013.06.034.
- 4- Harun SMR, Ogneva-Himmelberger Y. Distribution of industrial farms in the United States and socioeconomic, health, and environmental characteristics of counties. *Geogr J*. 2013;2013:12. doi:10.1155/2013/385893
- 5- Pavilonis BT, Sanderson WT, Merchant JA. Relative exposure to swine animal feeding operations and childhood asthma prevalence in an agricultural cohort. *Environ Res*. 2013;122(2013):74–80.
- 6- Loftus C, Yost M, Sampson P, Torres E, Arias G, Vasquez VB, et al. Ambient ammonia exposures in an agricultural community and pediatric asthma morbidity. *Epidemiology (Cambridge, Mass)*. 2015;26(6):794–801. doi:10.1097/EDE.0000000000000368.
- 7- Shartz A, Long SK, Karpman M, Kenney GM, Zuckerman S. QuickTake: insurance coverage gains cross economic, social and geographic boundaries. *Age (years)*. 2015;18(30):23.4.
- 8- Abraham J, Drake C, McCullough JS, Simon K, Henning-Smith C, Kozhimannil K et al. Rural-urban differences in insurer participation for marketplace-based coverage. 2016. <http://rhrc.umn.edu/wp-content/uploads/2016/08/Marketplace-Insurer-Participation.pdf>.
- 9- Barker AR, Huntzberry K, McBride TD, Mueller KJ. Changing rural and urban enrollment in state Medicaid programs, Brief no. 2017–2. In: RUPRI Center for Rural Health Policy Analysis. 2017. <http://cph.uiowa.edu/rupri/publications/policybriefs/2017/Changing%20Rural%20and%20Urban%20Enrollment%20in%20State%20Medicaid%20Programs.pdf>. Accessed 2/19/2017.
- 10- Petterson SM, Phillips RL, Bazemore AW, Koinis GT. Unequal distribution of the U.S. primary care workforce. Robert Graham Center; 2013. <http://www.graham-center.org/rgc/publications-reports/publications/one-pagers/unequal-distribution-2013.html>. Accessed 2/1/2017.
- 11- Garcia E, Serban N, Swann J, Fitzpatrick A. The effect of geographic access on severe health outcomes for pediatric asthma. *J Allergy Clin Immunol*. 2015;136(3):610–8. doi:10.1016/j.jaci.2015.01.030. [PubMed] [CrossRef] [Google Scholar]
- 12- U.S. Department of Health and Human Services FOOHRP. Defining rural population. 2017. <https://www.hrsa.gov/ruralhealth/aboutus/definition.html>. Accessed 2/1/2017.
- 13- Rural Health Information Hub. What is rural? 2015. <https://www.ruralhealthinfo.org/topics/what-is-rural>. Accessed 2/1/2017.
- 14- USDA Economic Research Service. Population & migration overview. 2016. <https://www.ers.usda.gov/topics/rural-economy-population/population-migration/>. Accessed 2/12/2017.
- 15- USDA Economic Research Service. Geography of poverty. 2016. <https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty.aspx>. Accessed 2/1/2017.
- 16- U.S. Census Bureau. Geographic terms and concepts—census divisions and census regions. 2015. https://www.census.gov/geo/reference/gtc/gtc_census_divreg.html. Accessed 3/13/2017.
- 17- Housing Assistance Council. Race and ethnicity in rural America. In: Rural research briefs; 2012. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiz5Z_ghIHSaHVCOCYKHUZIAlMQFggeMAA&url=http%3A%2F%2Fwww.ruralhome.org%2Fstorage%2Fresearch_notes%2Frrn-race-and-ethnicity-web.pdf&usg=AFQjCNE3fuwqa1JMduhdw2bM_jFjmoDCXw. Accessed 2/1/2017. [Google Scholar]
- 18-•• Pesek RD, Vargas PA, Halterman JS, Jones SM, McCracken A, Perry TT. A comparison of asthma prevalence and morbidity between rural and urban schoolchildren in Arkansas. *Ann Allergy Asthma Immunol*. 2010;104(2):125–31. doi:10.1016/j.anai.2009.11.038. [PMC free article] [PubMed] [CrossRef] [Google Scholar] Asthma prevalence was similar between representative rural and urban groups in Arkansas, but asthma morbidity was significantly higher in the rural group.

- 19- Magasi S, Wong A, Gray DB, Hammel J, Baum C, Wang C-C, et al. Theoretical foundations for the measurement of environmental factors and their impact on participation among people with disabilities. *Arch Phys Med Rehabil.* 2015;96(4):569–77. doi:10.1016/j.apmr.2014.12.002. [PubMed] [CrossRef] [Google Scholar]
- 20- Housing Assistance Council. Taking stock: rural people, poverty, and housing in the 21st century. 2012. <http://www.ruralhome.org/component/content/article/587-taking-stock-2010>.
- 21- Beck AF, Huang B, Kerckmar CM, Guilbert TW, McLinden DJ, Lierl MB, et al. Allergen sensitization profiles in a population-based cohort of children hospitalized for asthma. *Ann Am Thorac Soc.* 2015;12(3):376–84. doi:10.1513/AnnalsATS.201408-376OC. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- 22- Coleman AT, Rettiganti M, Bai S, Brown RH, Perry TT. Mouse and cockroach exposure in rural Arkansas Delta region homes. *Annals of Allergy, Asthma & Immunology.* 2014;112(3):256–60. doi:10.1016/j.anai.2014.01.002. [PubMed] [CrossRef] [Google Scholar]
- 23- Price D, Roche N, Virchow CJ, Burden A, Ali M, Chisholm A, et al. Device type and real-world effectiveness of asthma combination therapy: An observational Study. *Respir Med* 2011; 105: 1457-66.
- 24- Scichilone N, Benfante A, Bocchino M, Braido F, Paggiaro P, Papi A, et al. Which factors affect the choice of the inhaler in chronic obstructive respiratory disease? *Pulm Pharmacol Ther* 2015; 31: 63-7.
- 25- Khan MT, Azhar S. A study investigating the community pharmacist knowledge about appropriate use of inhaler, eastern Region Alahsa, Saudi Arabia. *Saudi Pharm J* 2013; 21:153-7.
- 26- Briggs A, Chrystyn H, Rand C, Scheuch G, Bousquet J. Inhaler competence in asthma: common errors, barriers to use and recommended solution. *Respir Med* 2013; 107: 37-46.
- 27- Jackson JD, Sykes A, Mallia P, Johnston LS. Asthma exacerbations: Origin, effect and prevention. *J Allergy Clin Immunol* 2011; 128:1165-74.
- 28- Akinbami JL, Sullivan DS, Campbell DJ, Grundmeier WR, Hartert VT, Lee AT, et al. Asthma outcomes: Healthcare utilization and costs. *J Allergy Clin Immunol* 2012; 129: S49-64.
- 29- Chippes EB, Zeiger SR, Borish L, Wenzel ES, Yegin A, Hayden LM, et al. Key findings and clinical implications from the Epidemiology and natural history of asthma: Outcomes and Treatment Regimens (TENOR) study. *J Allergy Clin Immunol* 2012; 130: 332- 42.
- 30- Cooper V, Metcalf L, Versnel J, Upton J, Walker S, Horne R. Patient-reported side effects, concerns and adherence to corticosteroid treatment for asthma, and comparison with physician estimates of side-effect prevalence: a UK-wide, cross-sectional study. *NPJ Prim Care Respir Med* 2015; 25: 15026.
- 31- Tran N, Coffman M J, Sumino K, Cabana DM. Patient reminder systems and asthma medication adherence: a systemic Review. *J Asthma* 2014; 51: 536-43.
- 32- Boulet LP, Boulay MÈ, Gauthier G, Battisti L, Chabot V, Beauchesne MF, et al. Benefits of asthma education program provided at primary care sites on asthma outcomes. *Respir Med* 2015; 109: 991-1000.
- 33- Voorend-van Bergen S, Vaessen-Verberne AA, Landstra AM, Brackel HJ, van den Berg NJ, Caudri D, et al. Monitoring childhood asthma: web based diaries and the asthma control test. *J Allergy Clin Immunol* 2014; 133: 1599-605.
- 34- Vaidya V, Gupte R, Balkrishnan R. Failure to refill essential prescription medications for asthma among pediatric Medicaid beneficiaries with persistent asthma. *Patient Prefer Adherence* 2013; 7: 21-6.
- 35- Muller T, Muller A, Hubel C, Knipel V, Windisch W, Cornelissen GC, et al. Optimizing inhalation technique using web-based videos in obstructive lung diseases. *Respir Med* 2017; 129: 140-4.
- 36- Rubin AS, Souza-Machado A, Andradre-Lima M, Ferreira F, Honda A, Matoso TM; QUALITX Study Investigators. Effect of Omalizumab as Add-On Therapy on Asthma-Related Quality of Life in Severe Allergic Asthma: A Brazilian Study. *J Asthma* 2012; 49: 288-93.