

**PREVALENCE OF ASTHMA IN RAJGARH DISTRICT, M.P., A
COMPARATIVE ANALYSIS OF COST OF CURATIVE AND
SUPPORTIVE MEDICATIONS USED IN ASTHMA AND
PRESCRIBING STANDARDS AUDIT**

SUMMER PROJECT

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CERTIFICATE

This is to certify that the project entitled “**Prevalence of Asthma in Rajgarh District, MP, a Comparative Analysis of Cost of Curative and Supportive Medications Used in Asthma and Prescribing Standards Audit**” submitted in partial fulfilment of the requirement for the degree of Master of Business Administration in IIHMR, Jaipur embodies the original work carried out by **Astitva Gupta** under my supervision at School of Pharmaceutical Management, IIHMR University, Jaipur.

The work has not been submitted in part or full for the award of any other diploma/degree in any other university in our knowledge.

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ASTITVA GUPTA

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INTRODUCTION

Asthma is one in all the most important communicable diseases. [1] It affects the airways within the lungs. The airway is the tube that carries air in and out of the lungs. In asthma, the airways become inflamed and usually narrow.

Asthma affects individuals from all ages, and it typically starts from childhood. Wheezing, cough and feeling of tightness within the chest are the symptoms which may vary from delicate to severe and may happen a day or once during a while. Things akin to cold air can depart or worsen the asthma symptoms. These are called asthma triggers. It is called asthma attack when the symptoms get worse.[2]

More than 339 million people were detected with asthma globally in 2016 as mentioned by WHO. It is a typical illness among the children. Most asthma-associated deaths arise in low- and middle-income countries. The death toll was at 417,918 due to asthma at the global level. It occurs regardless of the level of development of the country Asthma is underdiagnosed and poorly treated, this places a heavy burden on individuals and families, and often limits the activities of individuals throughout their lives.[1]

Asthma is a chronic inflammatory disease that affects the airways. The cause may vary from person to person, but when the airway touches the trigger, becomes inflamed, narrows, and fills with mucus, one thing remains the same. The narrowing of the airway may be due to muscle spasms around the airway, inflammation and swelling of the inner lining, or a large amount of mucus inside. , Heartburn, smoking, sinusitis, medications, weather, smoke, etc.[3]

TYPES OF ASTHMA

Asthma can be very mild and requires little medication or treatment, but it can also be very serious and life-threatening. Asthma is divided into mild to severe types. These types are determined by the frequency and severity of asthma symptoms.

- Mild Intermittent Asthma
- Mild Persistent Asthma
- Moderate Persistent Asthma
- Severe Persistent Asthma

Mild Intermittent Asthma - has mild symptoms. Symptoms last up to 2 days a week or 2 nights a month. This type of asthma usually does not interfere with your activities and may include exercise-induced asthma. Symptoms include shortness of breath, cough, airway inflammation, and airway mucus accumulation. Mild asthma is the most common type of asthma. Its symptoms are so mild that it is more likely to be untreated and undetected. Risk factors include family history of asthma, second-hand or passive smoking, allergies, obesity, exposure to pollution or smoke, exposure to occupational chemicals, etc.

Mild Persistent Asthma – has mild symptoms, but it occurs more than twice a week, but not more than once a day. Symptoms include wheezing or wheezing, coughing, airway swelling, airway mucus accumulation, chest tightness or pain. The risk factors are the same as for mild intermittent asthma.

Moderate Persistent Asthma – In moderate persistent asthma, symptoms appear daily or almost once a day. Symptoms appear at least once a week. Symptoms include wheezing or wheezing, coughing, respiratory tract inflammation, mucus accumulation in the respiratory tract, chest tightness or chest pain. The risk factors are the same for any type of asthma.

Severe Persistent Asthma – This type of asthma has symptoms several times a day. Symptoms can appear many nights a week. Persistent asthma is difficult to treat with medication, even with regular use. Almost all types of asthma have the same symptoms. Persistent severe asthma can affect any age group; it may start with different types of asthma and gradually worsen; it can also start seriously, although in these cases you may have an undiagnosed milder case of asthma. it can be caused by a respiratory disease such as pneumonia. Severe asthma can also be due to hormonal changes. It is the least common form of asthma. Other risk factors are the same as for the other types of asthma.

With any type of asthma, it is important to educate yourself about your condition in order to control your symptoms. Asthma can be controlled through an asthma action plan developed with your doctor that lists the steps to take in the event of an asthma attack.[4] Another classification divides asthma into allergic asthma, non-allergic asthma, seasonal asthma, occupational asthma, exercise-induced asthma, uncontrollable asthma, severe asthma, or fragile asthma. [5]

TREATMENT

Long-term prevention and control is the key to stopping asthma before it attacks. Treatment usually includes learning to recognize triggers, learning how to avoid them, and monitoring your breathing to ensure that medications can control symptoms.

Medication – The right medication for a person will depend on factors such as age, symptoms, asthma triggers, and the most appropriate medication for the patient. **Long-term medications** are usually taken daily and reduce the risk of an asthma attack. Medications include inhaled corticosteroids such as fluticasone, budesonide, ciclesonide, beclomethasone and mometasone, and leukotriene modulators such as montelukast, zafirlukast and zileuton. **Quick-acting drugs** are used to relieve symptoms quickly and short-term during an asthma attack. It is also recommended to consume before exercise. Medications that can be taken are beta-agonists with cutting effects that quickly relieve symptoms during an asthma attack within minutes, and include salbutamol and levosalbutamol, which can be taken with a hand-held inhaler, anticholinergics such as ipratropium and tiotropium act quickly and worry the airways relax immediately, making breathing easier, and **Oral and intravenous corticosteroids** such as prednisone and methylprednisolone can help relieve airway inflammation caused by severe asthma. When allergies make asthma worse, allergy

medicine can help. Allergy injections or immunotherapy usually reduce the immune system's response to certain allergens and biological agents (such as omalizumab, mepolizumab), Dupilumab, reslizumab and benralizumab are used in patients with severe asthma.

Bronchial Thermoplasty – It is used for severe asthma that does not get better after treatment with inhaled corticosteroids or other long-term asthma medications. It's not widely used and not even suitable for everyone. In bronchial thermoplastics, doctors use heat to heat the inside of the airways of the lungs, which causes the smooth muscles of the airways to contract, reduces the ability of the airways to contract, makes breathing easier, and reduces asthma attacks. [6]

PRESCRIBING STANDARDS

WHO has set some guidelines for writing prescription which include general demographic details, date of prescribing, dosage form, quantity to be taken, warnings and instructions, etc. The purpose of prescription audit is to check and understand the prescribing habit of doctor and enhance the patient care service and better understanding of the medication. The basic requirement of a prescription is to be clear and understandable. And the standards act as a guide to improve the quality of the prescriptions. Auditing will help in finding out the quality of the prescriptions of the doctors. [7]

LITERATURE REVIEW

- The 2017 study by Kumar Prakash and Ram Usha found that the prevalence of asthma increased from 41.9 in 1000 inhabitants in 2004-05 to 54.9 in 2011-12. Asthma reports were higher in the poorest countries than in the rich countries. The prevalence is higher in the northern states of the country, while the prevalence is lower in the north-eastern states. Young and old people have a higher risk of asthma. The disease burden in 2015 is estimated to be close to 65 million people, and more than 82,000 people died of asthma. The households using solid fuels has the highest burden. The study concluded that minimizing the use of solid fuels could eliminate one-third cases of asthma. [8]
- According to NFHS4, 2015-16, 1,857 women and 1,094 men out of 100,000 people have asthma. In addition, the prevalence of asthma is higher in the elderly and people with low education. The prevalence of asthma is more in females as compared to males. The highest prevalence is among the age group of 35-49 years. The Muslim religion has the highest individuals with the disease. Males with less than 5 years of schooling had the highest diseased individuals while in females the highest number of disease prevalence is in those who had no schooling. [9]
- Jindal S.K. reported in his article that the prevalence of asthma is 2.38% in 73,605 individuals of over 15 years of age in the nation. Females, older age, normal urban life, lower socioeconomic status, history of atopic allergies, first-degree asthma, and all forms of smoking are associated with a higher likelihood of asthma. For the first time in the study, there is clear evidence of a statistically significant association between ETS exposure and COPD in non-smokers. [10]
- Panayappan L. et al. Carried out a review study on the prescription audit and prescribing indicators. In their study, they analyzed prescribing standards, doctor's name, signature, patient demographics, clinical diagnosis, department, , etc. They found out that most of the practitioners do not follow the prescribing and usage guidelines of drugs. It suggested a need of rational use of drug and ethical prescribing habits. This will decrease unnecessary expenditure for the patient and improper dispensing. [11]

OBJECTIVES

- To derive the prevalence of asthma in the Rajgarh District of MP with respect to other cities with higher prevalence.
- To find the medicines used in Asthma for curative treatment and supportive medication.
- To assess the variation in the cost of treatment used in curative treatment and supportive medication.
- To audit the adherence to prescription standards by the doctors.

RESEARCH QUESTION

1. What is the prevalence of asthma in Rajgarh District, MP and how is it different from other cities with higher prevalence?
2. What is the variation in the cost of curative and the supportive therapy of asthma?
3. How well do the doctors adhere to the prescription standards?

METHODOLOGY

Sample Design: The study was quantitative research approach, and the respondents were the asthma patients.

Data collection method: The data was collected by using standard questionnaires which were facilitated by the enumerators across the district.

Sample size: 50 Prescriptions.

Analysis: Analysis was done by using Microsoft Excel.

Data collection tool: Semi-structured Questionnaires.

Exclusion and Inclusion criteria: The prescriptions of Rajgarh district were only considered.

Study area: Rajgarh District, Madhya Pradesh

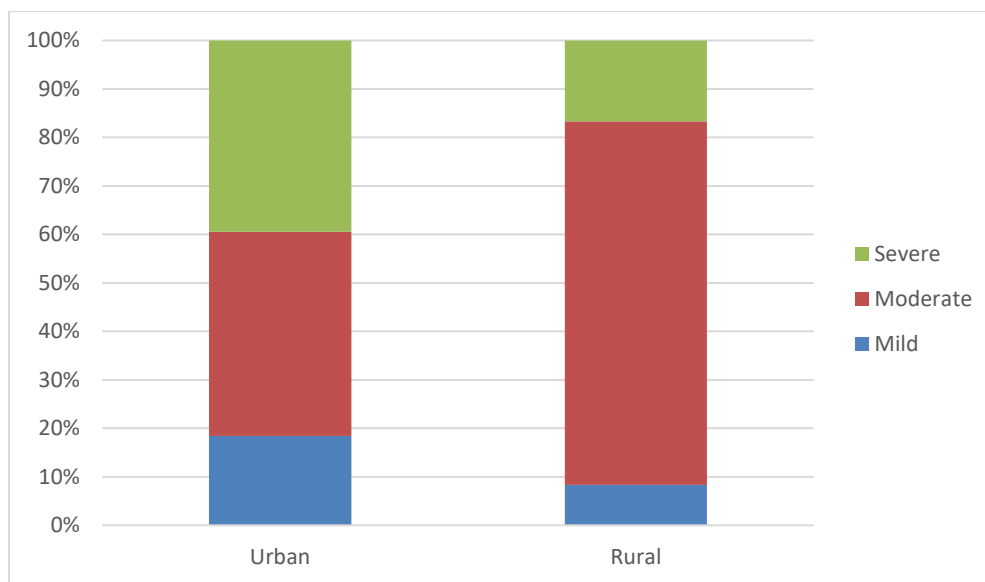
RESULT AND DISCUSSION

The study included a total of 50 prescriptions. The respondents included the patients diagnosed with asthma.

The data was collected using Google forms by the various pharmacists in the district as enumerator and evaluated using excel. The study gives the correlation and count of the various variables on the basis of the severity of asthma.

Proportion of severities of asthmatic patients in urban and rural areas

Area	Severity			Grand Total
	Mild	Moderate	Severe	
Urban	7	16	15	38
Rural	1	9	2	12
Grand Total	8	25	17	50



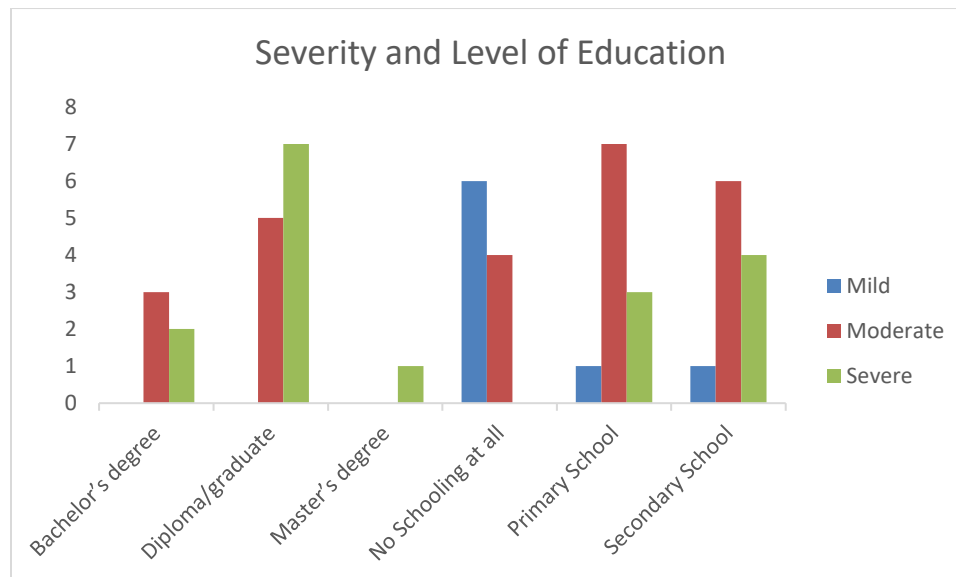
The table suggests that there is a huge difference in the no. of asthma patients in rural areas as compared to urban areas. 76% of the total respondents were from urban areas while only 24% were from rural areas.

Prevalence of Asthma in Rajgarh District, M.P. and a Comparative Analysis of Cost of Curative and Supportive Medications used in Asthma

The percentage of patients with moderate asthma is the most in both the areas followed by severe and then mild asthma.

Relationship between level of education and severity of Asthma

Level of Education	Severity		
	Mild	Moderate	Severe
Bachelor's degree	0	3	2
Diploma/graduate	0	5	7
Master's degree	0	0	1
No Schooling at all	6	4	0
Primary School	1	7	3
Secondary School	1	6	4
Grand Total	8	25	17

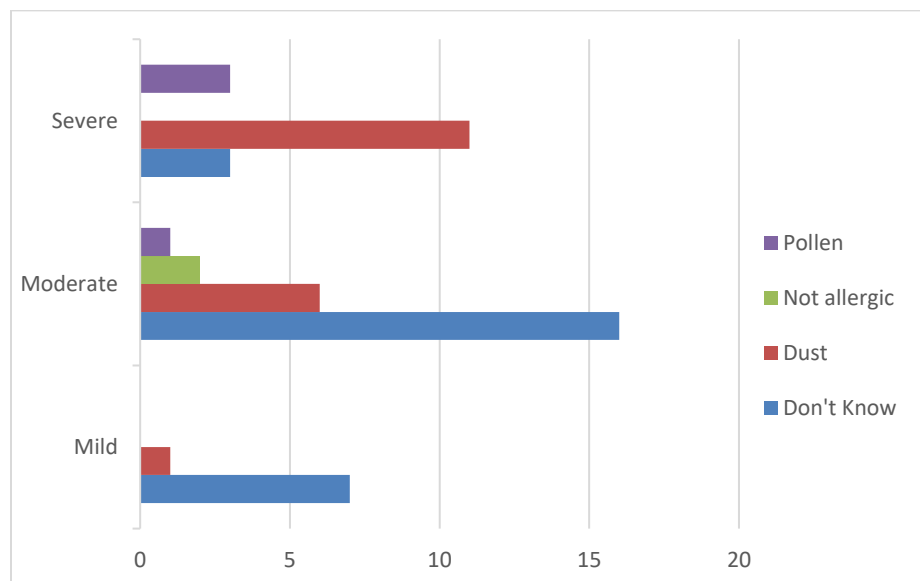


The data suggests that the highest numbers of severe asthma cases were in the sample with diploma or graduate level of education. While moderate asthma cases were highest in the level of primary school. Mild cases were the most in the sample with no schooling at all.

Relationship between severity and the allergies.

Prevalence of Asthma in Rajgarh District, M.P. and a Comparative Analysis of Cost of Curative and Supportive Medications used in Asthma

Severity	Don't Know	Dust	Not allergic	Pollen	Grand Total
Mild	7	1	0	0	8
Moderate	16	6	2	1	25
Severe	3	11	0	3	17
Grand Total	26	18	2	4	50

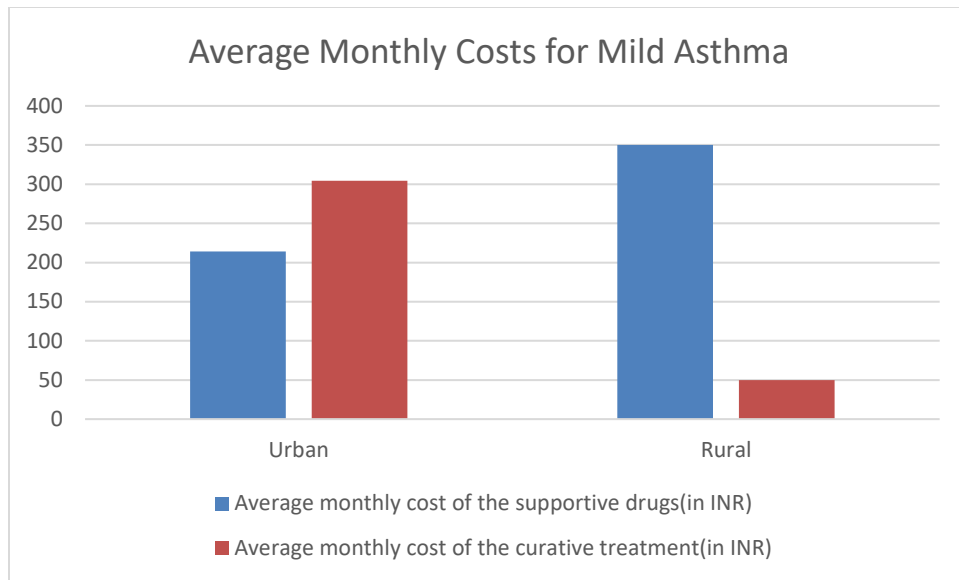


In the severe cases, there was the highest prevalence of patients with dust allergy. The lowest reported cases were of pollen allergy while only 2 cases were without allergies. There was a high number of patients who were unaware if they had any allergies or not. Most of the mild asthma cases were unaware if they were allergic or not.

Average cost of curative and supportive treatment (for mild asthma)-

Area	Average monthly cost of the supportive drugs (in INR)	Average monthly cost of the curative treatment (in INR)
Urban	214.2857	304.2857
Rural	350	50

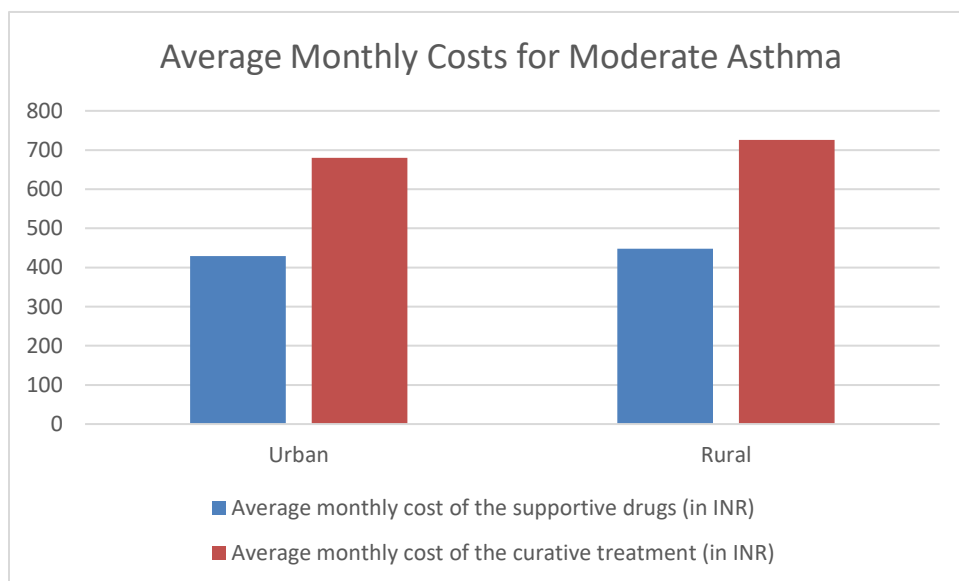
Prevalence of Asthma in Rajgarh District, M.P. and a Comparative Analysis of Cost of Curative and Supportive Medications used in Asthma



The average monthly cost of curative medicines is greater than the supportive medication in mild asthma in urban areas. While in rural areas the average monthly cost of supportive treatment is almost 7 times the average cost of curative treatment. Moreover, the cost of comprehensive treatment in urban areas is higher than in rural areas.

Average cost of curative and supportive treatment (for moderate asthma)-

Area	Average monthly cost of the supportive drugs (in INR)	Average monthly cost of the curative treatment (in INR)
Urban	428.75	680
Rural	447.7778	725.5556

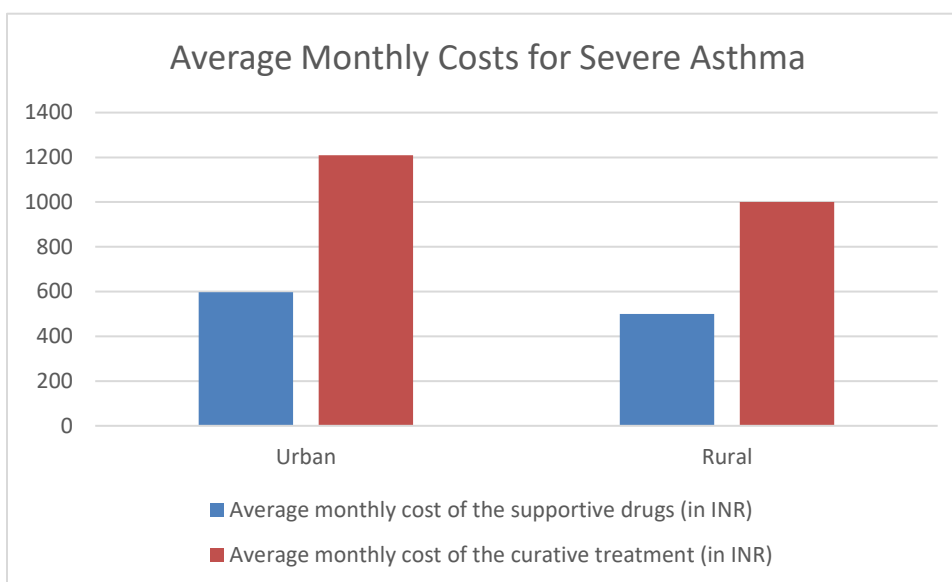


Prevalence of Asthma in Rajgarh District, M.P. and a Comparative Analysis of Cost of Curative and Supportive Medications used in Asthma

The average monthly cost of moderate asthma patients of the curative treatment in urban as well as rural areas is higher than the average cost of supportive medication. The average total treatment cost in rural areas is slightly higher than in urban areas.

Average cost of curative and supportive treatment (for severe asthma)-

Area	Average monthly cost of the supportive drugs (in INR)	Average monthly cost of the curative treatment (in INR)
Urban	597.3333	1210
Rural	500	1000



The average monthly cost of supportive drugs for severe asthma is lower than the average cost of curative drugs for both urban and rural. The average total cost of treating severe asthma is higher in urban areas than in rural areas.

Drugs used in the treatment for Mild Asthma-

Drugs used in Mild Asthma	
Curative Drugs	Supportive Drugs
Salbutamol	Cefpodoxime
Ambroxol + Levosalbutamol + Guaifenesin	Cefixime
Levosilbutamol	Roxithromycin
Montelukast + Levocetirizine	Guaifenesin + terbutaline + Bromhexine
Montelukast + Fexofenadine	Phenylephrine + Chlorpheniramine + Dextromethorphan

Prevalence of Asthma in Rajgarh District, M.P. and a Comparative Analysis of Cost of Curative and Supportive Medications used in Asthma

Doxofylline + Guaifenesin + Terbutaline + Bromhexine Budesonide	Lansoprazole Pantoprazole Mefenamic acid + Paracetamol Chlorpheniramine + phenylephrine
---	--

The patients with mild asthma were given bronchodilators like, β_2 Sympathomimetics and methylxanthines, leukotriene antagonists, H1 antagonists and inhalational corticosteroids. And the supportive medications included antibacterial agents, anti-tussive agents, H1 antagonists, proton pump inhibitors, NSAIDS, etc.

Drugs used in the treatment for Moderate Asthma-

Drugs used in Moderate Asthma	
Curative Drugs	Supportive Drugs
Levosalbutamol	Roxithromycin
Montelukast + fexofenadine	Cefpodoxime
Ambroxol + Levocetirizine + Montelukast	Amoxycillin + Clavulanic Acid
Montelukast + Levocetirizine	Roxithromycin + Ambroxol
Theophylline	Cefixime
Budesonide	Levofloxacin
Etofylline + Theophylline	Amoxicillin + Clavulanic Acid
Levosalbutamol + Beclomethasone	Ciprofloxacin
Montelukast + Levocetirizine +	Phenylephrine
Acebrophylline	Pantoprazole
Bilastine + Montelukast	Paracetamol
Salbutamol	Domperidone + Pantoprazole
Etophylline +Theophylline	Rabeprazole
Doxofylline	Chlorpheniramine + Phenylephrine +
Ambroxol + Levosalbutamol + Guaifenesin	Dextromethorphan
Acebrophylline	Nimesulide + Paracetamol
Guaifenesin + Terbutaline + Bromhexine	Mefenamic Acid + Paracetamol
Formoterol + Budesonide	Pantoprazole + Domperidone
Fluticasone + Levosalbutamol	Chlorpheniramine
	Dextromethorphan
	Chlorpheniramine + Dextromethorphan
	Ibuprofen + Paracetamol
	Ambroxol + Cetirizine + Dextromethorphan
	+ Guaifenesin + Phenylephrine
	Chlorpheniramine + Phenylephrine +
	Paracetamol + Sodium Citrate

Moderate asthma patients were prescribed oral and inhalational β_2 sympathomimetics, methylxanthines, leukotriene antagonists, inhalational corticosteroids and H1 antagonists. These curative medicines were accompanied with antibacterial agents, antitussives, NSAIDS, anticold combinations, antihistamines, proton pump inhibitors, etc.

Drugs used in the treatment for Severe Asthma-

Drugs used in Severe Asthma	
Curative Drugs	Supportive Drugs
Etofylline + theophylline Theophylline Montelukast + Fexofenadine + Acebrophylline Levosalbutamol + Beclomethasone Bilastine + Montelukast Formoterol + Budesonide Salbutamol Bilastine Montelukast + Fexofenadine Ambroxol + Montelukast + Levocetirizine Salmeterol + Fluticasone Deflazacort Acebrophylline Fexofenadine + Montelukast Fluticasone + Salmeterol Montelukast + Levocetirizine Montelukast + Levocetirizine + Ambroxol Fluticasone Ambroxol + Guaifenesin + Terbutaline Ambroxol + Levosalbutamol + Guaifenesin Formoterol + Fluticasone Fluticasone + Levosalbutamol Levosalbutamol Budesonide	Levofloxacin Moxifloxacin + Cefixime Cefixime Pantoprazole Amoxycillin + Clavulanic Acid Cefpodoxime Magaldrate + Simethicone Rabeprazole + Domperidone Omeprazole + Domperidone Roxithromycin + Ambroxol Pantoprazole + Domperidone Paracetamol Ambroxol + Cetirizine + Dextromethorphan + Guaifenesin + Phenylephrine Nimesulide + Paracetamol Esomeprazole + Domperidone Deflazacort Sodium Picosulfate + Liquid Paraffin + Milk of Magnesia Ambroxol + Dextromethorphan + Phenylephrine + Chlorpheniramine + Menthol

The prescription for severe asthma patients included glucocorticoids (corticosteroids) both oral as well as inhalational, leukotriene antagonists, β_2 sympathomimetics both inhalational as well as oral, methylxanthines, H1 antagonists, etc. The supportive treatment for these patients included NSAIDS, antibacterial agents, antacids, proton pump inhibitors, antitussives, anticold combinations, etc.

The prevalence of asthma is highest in Bangalore in India reported 3.47% prevalence, as found in a study conducted by Aggarwal A N et al [12] followed by Chandigarh with 2.28% prevalence, Kanpur with 2.05% prevalence and Delhi with 1.69% prevalence. According to NFHS 4, 2015-16,

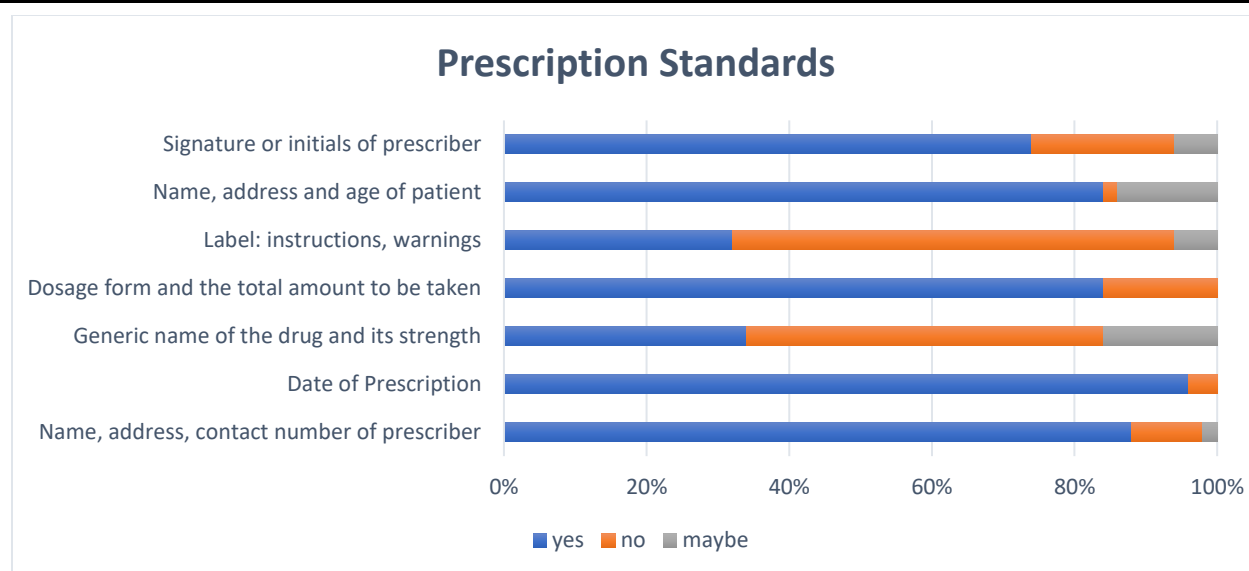
there are 1,857 women and 1,094 men for every 100,000 asthmatics in Madhya Pradesh. [13]. The prevalence is thus 1.47%.

The higher number of patients from urban areas in the study is attributed to high level of dust in some of the urban areas. And so is visible from the high number of patients with dust allergy in urban areas. The urban settlements were mostly from the villages who shifted to the urban areas for work or for business. Since the high number of patients from rural areas were unaware if they had any sort of allergy or not, even though a good proportion of them have been prescribed anti-allergic medication. The proportion of the average cost of supportive medication in the prescriptions was almost 1/3rd of the total cost of the prescription in severe asthma cases. In moderate asthma cases this proportion is almost 2/5th. And even greater in the mild asthma cases.

Prescription Standards Audit

Standards	YES	NO	MAYBE
Does the prescription contain the Name, address, contact number of the prescriber?	44	5	1
Does the prescription contain the Date of Prescription?	48	2	0
Does the prescription contain the Generic name of the drug and its strength?	17	25	8
Does the prescription contain the Dosage form and the total amount to be taken?	42	8	0
Does the prescription contain the Label: instructions, warnings?	16	31	3
Does the prescription contain the Name, address and age of patient?	42	1	7
Does the prescription contain the Signature or initials of prescriber?	37	10	3

Only 4 prescriptions, i.e., 8% of all the prescriptions were able to totally comply with the standards. Most of the prescription were without warnings and instructions. 50% of the prescriptions had brand names of drugs. Majority of the prescriptions contain date of the prescription and the name, address, contact number of the prescriber. The signature and initials of the prescribers were not reported in 10 prescriptions. The total amount to be taken and the dosage form were in 84% of the prescriptions, while in 16% of the prescriptions these were not found. The name of the patient, address and age were found in 84% of the prescriptions.



Since most of the prescriptions were written under the letter head of the doctors, the information like the name, address and contact number of the prescriber were already present. Side-effects or ADRs may be commonly reported because of the lower number of prescriptions with warnings and instructions. Due to vigorous marketing strategies of various products available in the market the doctors now normally prescribe the brand name of the drug.

CONCLUSION

The data was collected using a questionnaire which was circulated in the pharmacists and chemist stores in the district and the details of the patients and their prescriptions were to be filled in it.

The prevalence of asthma in the district was found from the secondary data which was taken from National Family Health Survey-4. And the prevalence of asthma was found to be 1.43%. The cost of medicines is still huge for the common man and the proportion of supportive medicines adds the expenditure in the patients' pocket. Newer drugs keep adding up in the treatment of asthma and the patients are benefitted therapeutically. The government and several NGOs keep working on various campaigns for awareness but still the rural areas are deficient of general terms and conditions related to asthma as is seen in the case of allergies in this study.

Deeper insights can be brought into light in this area of research by using more demographic variables, clinical information, surveys, etc.

The doctors should be made aware of the need of prescribing according to the standards so as to avoid any misconception among the patient and the pharmacists regarding the medication or therapy.

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APPENDIX

Questionnaire-1

Q.1 Name of the patient. (Not Mandatory) _____

Q.2 Age of the patient. (in Yrs) _____

Q.3 What is the highest degree or level of school have the patient completed? (If currently enrolled, the highest degree received)

- ☐ No Schooling at all
- ☐ Primary School
- ☐ Secondary School
- ☐ Diploma/graduate
- ☐ Trade/technical/vocational training
- ☐ Associate degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Professional degree
- ☐ Doctorate degree

Q.4 Locality of residence

- ☐ Urban
- ☐ Rural

Q.5 Severity of Asthma

- ☐ Mild
- ☐ Moderate
- ☐ Severe
- ☐ Don't Know

Q.6 Does the patient have any of the following allergies?

- ☐ Not allergic
- ☐ Pollen
- ☐ Dust
- ☐ Mites
- ☐ Food

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- Don't Know
- Other:

Q.7 Which drugs or combinations have been prescribed to the patient for the management of asthma? _____

Q.8 What is the approximate monthly cost of the curative treatment? (in INR) _____

Q.9 Which supportive drugs are prescribed with the curative medications? (Write Nil if not prescribed) _____

Q.10 What is the monthly cost of the supportive drugs? (Write Nil if not prescribed) _____

Questionnaire-2

Q.1 Does the prescription contain the Name, address, contact number of prescriber?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.2 Does the prescription contain the Date of Prescription?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.3 Does the prescription contain the Generic name of the drug and its strength?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.4 Does the prescription contain the Dosage form and the total amount to be taken?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.5 Does the prescription contain the Label: instructions, warnings?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.6 Does the prescription contain the Name, address and age of patient?

- ☐ Yes
- ☐ No
- ☐ Maybe

Q.7 Does the prescription contain the Signature or initials of prescriber?

- ☐ Yes
- ☐ No
- ☐ Maybe