

# **IMPACT OF PHARMACIST INTERVENTION ON HEALTH PROMOTION ACTIVITIES IN ASTHMATIC PATIENTS**

**Dissertation**

**Submitted to**

**The Tamil Nadu Dr. M.G. R. Medical University, Chennai.**

**In partial fulfillment for the award of the degree of**

**MASTER OF PHARMACY**

**In**

**PHARMACY PRACTICE**

**By**

**SONIA C GEORGE**



**DEPARTMENT OF PHARMACY PRACTICE**

**ULTRA COLLEGE OF PHARMACY**

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**MADURAI – 625020.**

**OCTOBER 2013**

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**4/235, COLLEGE ROAD, THASILDAR NAGAR,**

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**OCTOBER 2013**

## **DECLARATION**

I hereby declare that this thesis work entitled **“IMPACT OF PHARMACIST INTERVENTION ON HEALTH PROMOTION ACTIVITIES IN ASTHMATIC PATIENTS”** submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai was carried out by me in the Department of Pharmacy practice, Ultra College of Pharmacy, Madurai under the valuable and efficient guidance of **Mr.S.K.Sathish, M.Pharm,** Department of pharmacy practice, Ultra College of Pharmacy, Madurai during the academic year Nov 2012-Oct 2013. I also declare that the matter embodied in it is a genuine work and the same has not to formed the basis for the award of any degree, diploma, associateship, fellowship of any other university or institution.

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---

## **CERTIFICATE**

This is to certify that, this thesis work entitled “**IMPACT OF PHARMACIST INTERVENTION ON HEALTH PROMOTION ACTIVITIES IN ASTHMATIC PATIENTS**” submitted in partial fulfillment of the requirements for the award of degree of Master of Pharmacy in Pharmacy Practice of The Tamil Nadu Dr. M.G.R Medical University, Chennai is a bonafide work carried out by **Reg No.26113488** and was guided and supervised by me during the academic year Nov 2012-Oct 2013.

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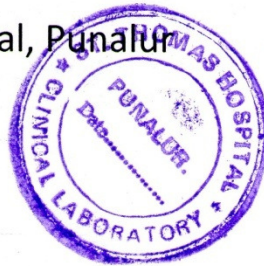
### TO WHOM SO EVER IT MAY CONCERN CERTIFICATE

This is certify that the dissertation entitled "IMPACT OF PHARMACIST INTERVENTION ON HEALTH PROMOTION ACTIVITIES IN ASTHMA PATIENTS" was carried out by Miss Sonia C George, 2nd year M.Pharmacy student of Ultra College of Pharmacy, Madurai, in the ST.Thomas Hospital, Punalur, Kollam (Dist), for a period of 6 months, under my direct supervision and guidance to my fullest satisfaction.

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**MADURAI.**

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### **EXAMINERS:**

1.

2.

**PLACE: MADURAI**

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*Dedicated*  
*to my beloved husband,*  
*Parents*  
*and the Almighty*



## ACKNOWLEDGEMENT

*Apart from my efforts, the success of this project depends largely on the encouragement and guidelines of many others. I take the privilege and pleasure to express my gratitude to the people who have been instrumental in the successful completion of this project.*

*I express my extreme sense of gratitude and profound thanks to my guide **Mr.S.K. Sathish M.pharm**, Assistant Professor, Department of Pharmacy practice, Ultra college of pharmacy, Madurai for his precious guidance, encouragement, abundant help, inspiring discussions and timely suggestions which proved for the success of this work.*

*I express my special thanks to **Dr. V S POTTY, MBBS,FRSH (LON)** Department of General Medicine, St.Thomas Hospital, kollam, Kerala, who had taken the pain to provide me with all the essential facilities for the completion of my project and has been a constant source of inspiration.*

*I do feel highly elated in manifesting a sense of gratitude to my honourable Chairman **Prof. K.R Arumugam, M.Pharm**, who permitted me to do this project and showered his blessings and guidance whole heartily in every walk of our successful careers.*

*It is my privilege and honour to extend my profound gratitude and express my indebtedness to our Dean **Dr.C.Vijaya. M.Pharm. Ph.D**, Ultra college of pharmacy, Madurai for her constant inspiration, valuable advice, help, encouragement and innovative ideas throughout the course of the project.*

*I wish to thank with pleasure and gratitude **Mr.T.Regupathi, M.Pharm, MLM. MBA** Department of pharmacy practice, Ultra college of pharmacy, Madurai for her valuable suggestions and support for the fulfilment of my dissertation.*

*My heartiest acknowledgement rendered to **Dr.K.G. Lalitha.,M.Pharm., Ph.D., Prof.Chandran, M.Pharm., Mr.Natarajan, M.Pharm., Ph.D., Mr.Senthil Kumar, M.Pharm., Mr.V.Sivanand, M.Pharm.**, Ultra College of Pharmacy, Madurai for their valuable suggestions throughout my thesis work*

*I sincerely extend my thanks to the Librarian **Mr. P.Sankar, BA,(Lit),M.L.I.Sc** Assistant Librarian **Ms.V. Sundhravalli, M.L.I.Sc** all the Laboratory staffs in Ultra College of Pharmacy.*

*I am thankful and express my most respectful regards to my batchmates especially **Miss. Surya, Mr. Bino, Mr. Jobu and Mr.Dennis, Mr. Dalvin and Mr.Prasanth** who have always supported and guided me.*

*I express thanks to my friends **Miss. Ruth, Mrs. Preetha, Miss. Geethu** for their support during my thesis.*

*Lastly I express my heartfelt gratitude to the Almighty God, without whose grace all these efforts would have been in vain.*

## LIST OF ABBREVIATIONS

<b>SL. No</b>	<b>ABBREVIATIONS</b>	<b>DESCRIPTION</b>
1	<b>FEVI</b>	Forced expiratory volume in one second
2	<b>FVC</b>	Forced vital capacity
3	<b>GINA</b>	Global Initiative for Asthma
4	<b>Mini AQLQ</b>	Mini Asthma Quality of Life Questionnaire
5	<b>SD</b>	Standard deviation
6	<b>WHO</b>	World Health Organization
7	<b>PEF</b>	Peak Expiratory Flow
8	<b>ACT</b>	Asthma Control Test
9	<b>df</b>	Degree of freedom

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## Patient Consent Form

**Mrs. SONIA C GEORGE** post graduate student of Ultra College of Pharmacy Madurai has made me understand below mentioned points in related to the study **“impact of pharmacist intervention on health promotion activities in asthmatic patients”**

- The Principal investigator had informed me about the complete description of the study.
- I wholeheartedly without any compulsion agree to give all the relevant data regarding the study.
- I am aware of to opt out this study at any given time without hindrance.
- The data collected should be kept under strict confidentiality.
- I will not be subjected to any harmful tests as a part of this study.
- I need not suffer any economic liabilities for this study.

Above mentioned statements are fully understood and the therefore I am willing to give my consent to participate on this study.

### Address of Investigator

**SONIA C GEORGE**  
**II year M. Pharm**  
**Ultra College of pharmacy**  
**Madurai**

**Patient Name:**

**Sign:**

ERRATA

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## INTRODUCTION

About one in 15 people has asthma, a chronic condition whose symptoms are attacks of wheezing, breathlessness, chest tightness, and coughing. This common condition is a major cause of lost workdays in adults and missed school days in children. There is no cure for asthma, but most people can control the condition and lead normal, active lives. Different things set off asthma attacks in different people. Smoke from cigarettes or a fire, air pollution, cold air, pollen, animals, house dust, molds, strong smells such as perfume or bus exhaust, wood dust, exercise, industrial chemicals; all can trigger an attack. Avoidance or reduced exposure to asthma precipitating factors or triggers is obviously of great importance in control of the disease.<sup>1,2,3,4</sup>

Asthma is a highly variable disease where the pattern, frequency and intensity of symptoms may vary within an individual over a period of time and may also vary among individuals in duration and severity. While there is no cure for asthma, these changing characteristics make the management of the disease a challenge for both the health care professional and patient. Given the highly variable nature of the disease, it is important that patients have a good understanding of the disease process, are able to recognize worsening asthma symptoms, and are able to appropriately use and correctly administer the asthma medications.

Asthma medications can help prevent and control symptoms, reducing the frequency and severity of asthma exacerbations and reversing airway obstruction. Their success is depend on their proper use and correct administration.<sup>5</sup>

Asthma is now one of the world's most common long-term conditions, according to the Global Burden of Asthma Report, which details the prevalence, morbidity, and mortality of asthma in many regions around the world, reveals a number of alarming facts about the burden of this chronic respiratory disease. The disease is estimated to affect as many as 300 million people worldwide, a number that could increase by a further 100 million by 2025. Due to rapid industrialization and urbanization throughout the region, the prevalence of asthma is predicted to increase rapidly in the coming years. The increase is likely to be particularly dramatic in India, which is projected to become the world's most populous nation by 2050. An absolute

2% increase in the prevalence of asthma in India would result in an additional 20 million people with the disease. So it is necessary to make asthma controlled.

Due to increasing incidence and prevalence, primary care providers should devote much time to caring for patients with asthma. Emphasis should be placed on evaluating the outcome of management in terms of provided education to asthma patients can improve adherence rates and patient understanding.

Pharmacists have a unique role in the care of these patients with the skills they possess to provide educational counseling and support for quality of life issues. Historically, the majority of asthma related studies were conducted to determine physiologic measures, cost benefits, and frequency of use of hospital services<sup>9</sup>. However, relatively little information has been collected on the way patients with asthma feel and how they function in their day-to-day lives<sup>10,11,12,13</sup>. Investigators recommended inclusion of quality of life questionnaires in future trials as well as follow up office visits to evaluate the components which the patient feels are the most important.<sup>14</sup> There are a few studies which provide evidence of improved patient medication adherence as a result of patient education provided by pharmacists<sup>16,17,18</sup>. When patients clarify their perceptions of the effects of asthma, they may be better able to choose courses of action to enhance their health and future. In this manner, the pharmacist can begin to assist the patient toward achieving goals that the patient decides are important for his or her quality of life. Studies have shown that asthma education programs have a positive impact on treatment outcomes in terms of reducing in number of hospital admissions, improved symptoms and improved medication usage techniques. These studies have shown that patient education is important in Indian setup because many patients are illiterate and come from low socio economic barriers<sup>9</sup>. The National Health Lung and Blood Institute guideline for diagnosis and management of asthma advocates that patient education is an essential part in asthma management.<sup>20</sup>

A mutual effort is required to make the patient's life more meaningful and personally fulfilling when illness symptoms and physical restrictions cannot be removed entirely. Therefore, the purpose of this study was to describe the effect of asthma in adults within the health care system on their quality of life.



The present study aims at assessing the influence of pharmacist provided health education on treatment outcomes in asthma patients. As part of the study the knowledge, attitudes and practices of asthma patients towards their disease and medication usage, inhaler usage technique and adherence behavior and quality of life of asthma patients are being assessed. Here Asthma Control Test has been used as the primary outcome as it is a rapid and easy tool to determine the level of asthma control of patients presenting at community health center and only few studies using ACT as been conducted in western world.

When managing chronic diseases like asthma measurement of quality of life is important as patients own experience of disease provides important information on treatment decisions. In this study mini Asthma Quality Of Life is used as it is short and easy to complete so it is beneficial in Indian setting and it includes physical and emotional changes that patient experiences which is very important.<sup>19</sup>

## **DEFINING ASTHMA**

The National Asthma Education and prevention program (NAEPP) of the Heart and Lung Blood institute defines asthma as a Chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, in particular, mast cells, eosinophills, T-lymphocytes, macrophages, neutrophills and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness. chest tightness and coughing, particularly at nights and in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment.<sup>20</sup>

## **FACTORS INFLUENCING THE DEVELOPMENT OF ASTHMA**

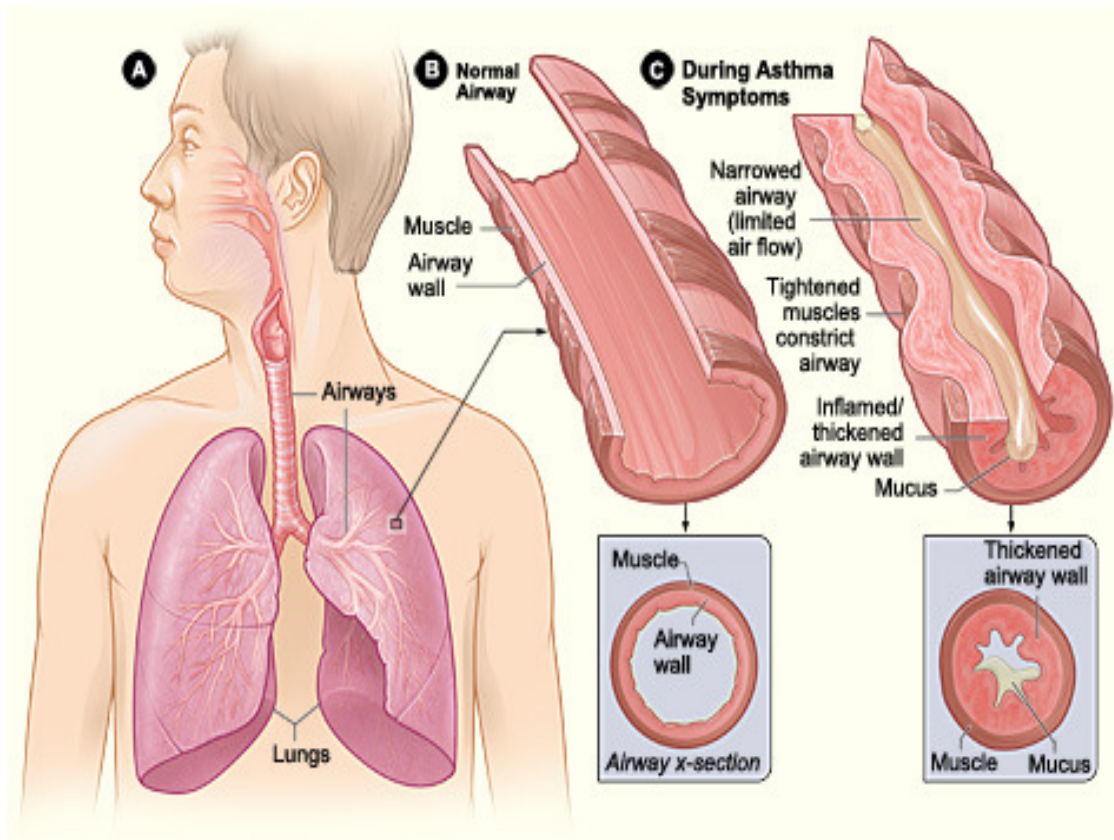
The factors that influence a person's risk of developing asthma have been identified and are broadly divided into unmodifiable host factors i.e. intrinsic factors within an individual (genetic predisposition to atopy and to airway hyper responsiveness, obesity and gender) and modifiable environmental factors (indoor/outdoor allergens, respiratory viral infections, occupational sensitizers, passive/active smoking, outdoor / indoor air pollution, diet). However, the mechanisms whereby they influence the development of asthma are complex and interactive. Genes may interact both with other genes and with environmental factors to determine asthma

susceptibility.<sup>21</sup> In addition, the maturation of the immune response and the timing of infectious exposures during the first years of life are emerging as important factors modifying the risk of asthma in the genetically predisposed individual.

## **PATHOPHYSIOLOGY**

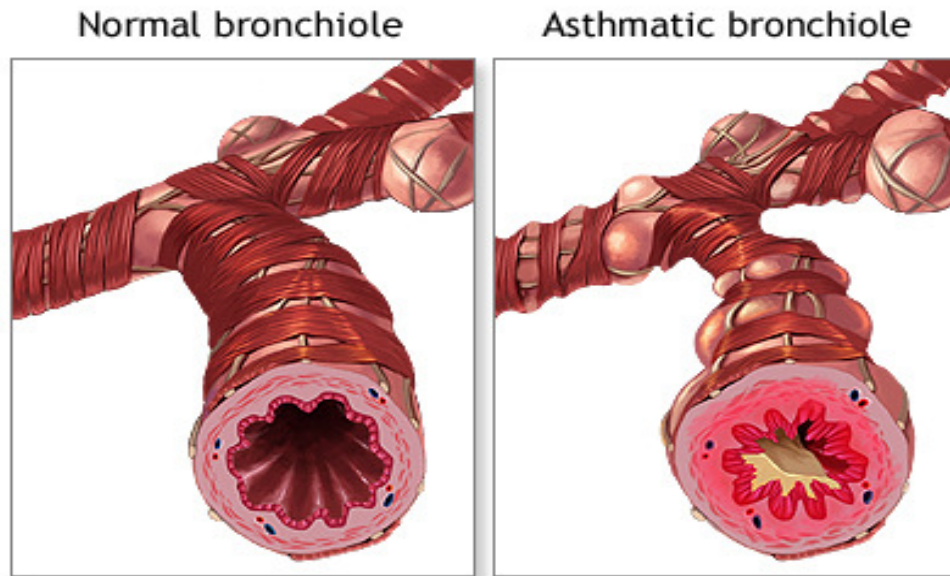
Airway inflammation is the primary problem in asthma. If the lungs are exposed to allergens, irritants, cold air or exercise, inflammatory mediators like histamine, tryptase, leu-cotrienes and prostaglandins from bronchial mast cell, alveolar macrophages, T lymphocytes and epithelial cells are released. The released inflammatory mediators directly cause acute bronchoconstriction and also direct the activation of eosinophils and neutrophils, and their migration to the airways, where they cause injury that result in epithelial damage, airway edema, mucus hyper secretion and hyper responsiveness of bronchial smooth muscle.<sup>21,22</sup>

## **Mechanism**



T- helper lymphocyte is the key in the pathogenesis of bronchial asthma. They include B cells to synthesise and secrete IgE through the production of interleukin 4 (IL-4) and induce eosinophilic inflammation via interleukin 5 (IL-5). Mast cells contribute to the inflammatory reaction by the production and release of histamine, tryptase, prostaglandin D<sub>2</sub> (PGD<sub>2</sub>) and leukotriene C<sub>4</sub> (LTC<sub>4</sub>).

These cells are involved in the early phases of asthma known as the early reaction. Unlike other types of cells mast cell membranes are stabilized by beta receptor agonists (such as salbutamol and terbutaline) and cromones (such as sodium cromoglycate).<sup>22</sup>



## RISK FACTORS

The strongest risk factor for developing asthma is a history of atopic disease. Numerous risk factors for asthma have been identified.

The best studied risk factors including

- Gender
- Airway hyper reactivity
- Atopy
- Allergens
- Infections
- Tobacco smoke
- Obesity
- Perinatal factors
- Oxidative stress
- Age
- Weather changes

- Pollens

In many areas pollens can be a problem from February to November each year. Patients allergic to pollens have to avoid contact with it. It is important that they should keep all car and house windows closed and use the air conditioning.

- Animal dander

Pets that have fur or feathers often cause allergy troubles. patients have to avoid pets out of home.

## **Signs and symptoms**

### **Early Asthma Symptoms**

Early warning signs are changes that happen just before or at the very beginning<sup>49</sup> of an asthma attack. These asthma attack symptoms may start before the well-known symptoms of asthma and are the earliest signs that your asthma is worsening.

In general, these signs are not severe enough to stop you from going about your daily activities. But by recognizing these signs, you can stop an asthma attack or prevent one from getting worse.

Early warning signs include:

- Frequent cough, especially at night. Losing your breath easily or shortness of breath
- Feeling very tired or weak when exercising
- Wheezing or coughing after exercise
- Feeling tired, easily upset, grouchy, or moody
- Decreases or changes in lung function as measured on a peak flow meter

- Signs of a cold, or allergies (sneezing, runny nose, cough, nasal congestion, sore throat, and headache)
- Trouble sleeping

The main symptoms that signal an attack are as follows

- Wheezing
- Coughing
- Shortness of breath
- Chest tightness/pain

Other nonspecific symptoms in infants or young children may be a history of recurrent bronchitis, bronchiolitis, or pneumonia; a persistent cough with colds; and/or recurrent croup or chest rattling.<sup>33</sup>

## **DIAGNOSIS OF ASTHMA**

A diagnosis of asthma usually is based on the patient's symptoms, medical history, a physical examination, and laboratory tests that measure pulmonary (lung) function. Evidence of reversible airway obstruction is often detected in the physical examination or by physiologic testing. Physiologic testing generally is recommended to confirm the diagnosis. During an asthma attack, wheezing can be heard by listening to the chest with a stethoscope. The airway obstruction is considered reversible if the wheezing disappears in response to treatment, or when the suspected triggering factor is removed or resolved.

## **EPIDEMIOLOGY OF ASTHMA**

**International Study** of Asthma and Allergies in Childhood (ISAAC) Steering Committee have demonstrated a wide variation in the incidence of asthma and have shown that the incidence, particularly in children, is increasing. The international pattern of prevalence cannot be completely explained by our current knowledge of recognized risk factors for the development of asthma and the reasons for the wide variations in

prevalence within and between populations remain unknown.

## **CLASSIFICATION OF ASTHMA SEVERITY**<sup>51</sup>

The National Asthma Education and Prevention Program classifies the asthma severity by following steps (Step 1 to Step 4)

**Step 1:** labels patients as being 'mild intermittent' category of asthma.

This group is defined as having more than 80% of FEV<sub>1</sub> / FVC ratio and less than 20% of PEF. These patients have symptoms occurring twice a week or less and night symptoms not more than twice a month

**Step 2:** classifies patients into "mild persistent" category.

These groups of patients have FEV<sub>1</sub> / FVC ratio is 80% or less than predicted and PEF value is 20 to 30%. These patients have symptoms occurring more than twice a week, exacerbations may affect activity and with night symptoms occurring more than twice a month.

**Step 3:** categorizes patients into 'moderate persistent' category.

This group is defined by having FEV<sub>1</sub> / FVC ratio more than 60% but less than 80% predicted and the PEF variability is more than 30%. These patients have daily symptoms and exacerbations affect the activity. This occurs more than twice a week and may last for days and with night symptoms occurring more than once a week

**Step 4:** labels patients as being 'severe persistent' category.

These groups of patients are defined by having FEV<sub>1</sub> / FVC ratio as 60% or less than predicted and PEF variability is more than 30%.

## **ASTHMA PREVALENCE**

Studies done by International Institute for Population Sciences (IIPS) and Macro International. 2007 has shown that information in the literature on the prevalence of asthma is inadequate as most of these studies lack the basic requirements needed for this type of exercise. These requirements are: adequate sample coverage representing all age groups, data from different regions in the country and adoption of uniform protocols. The

NFHS-3 is the only study which meets these requirements.

Hence, the results of NFHS-3 form the basis for estimation of the national prevalence of asthma.

Asthma prevalence according to National Family Health Survey-3, 2005-06 the overall prevalence of asthma among adult men and women in India is similar with 1,696 and 1,627 per 100,000 respectively.” The number of men and women with asthma increases steadily with age. Prevalence of asthma is higher in rural areas (1,719 per 100,000 for women and 1,799 per 100,000 for men) than for urban areas and that it is more common among women than men. Asthma among men is more prevalent in the lower wealth quintiles than among the higher wealth quintiles. Moreover, prevalence is highest among those with less than five years of schooling (2,283 per 100,000 among women and 2,640 among men per 100,000), and among those with no education (1,914 among women per 100,000 and 2,440 among men per 100,000).

According to World Health Organization report in India, its estimated that 57,000 deaths were attributed to Asthma in 2004.<sup>29</sup> Though effective screening, evaluation, and management strategies for Asthma are well established in high-income countries, these strategies have not been fully implemented in India as evidence had previously suggested that Asthma is not to be treated independently but fitted into the general spectrum of respiratory diseases. Furthermore, even though medicines that treat asthma effectively are available at affordable costs, they rarely reach more than one per cent of those who would benefit from it.

## **MANAGEMENT OF ASTHMA**

The National Asthma Education and Prevention Program (NAEPP), under the National Institutes of Health (NIH) National Heart, Lung and Blood Institute (NHLBI), issued the first Guidelines for the Diagnosis and Management of Asthma in 1991. As research advanced through the years, the Guidelines were updated, most recently as



Expert Panel Re-port3: Guidelines for the Diagnosis and Management of Asthma (EPR3). This research-based report offers step-by-step instructions for treating asthma.

The Guidelines Implementation Panel (GIP) isolated 6 measures that have the biggest impact on asthma care and patient health.

The Guidelines prioritize steps to diagnose and individually treat asthma symptoms so that patients require the least amount of medication to achieve maximum results. Federally funded research and programs have demonstrated repeatedly that the Guidelines work and save money: Once symptoms are stabilized and causative factors have been resolved, maintaining symptom-free days and nights becomes routine and cost effective.

The sooner we adopt Guidelines-level care for all patients, the sooner we'll start reducing asthma's \$20 billion annual price tag; children and families will experience fewer symptoms and get back to school and work; and asthma deaths will be eradicated.

## **6 GIP MEASURES AND ITS IMPORTANCE:**

The Guidelines Implementation Panel (GIP) isolated 6 measures they say could have the biggest impact on asthma care and patient health.

1. Inhaled corticosteroids are the most effective anti-inflammatory medications for long-term management of persistent asthma.

Inhaled corticosteroids treat the quietly smoldering part of asthma inflammation. (In-flamed airways are raw, swollen and filed with mucus.) Inhaled corticosteroids are particularly well suited for people whose stubborn symptoms hang on, even after they faithfully use other medications, eliminate known allergens and irritants and rule out interrelated medical conditions such as sinus infections or gastro esophageal reflux disease (GERD). Inhaled corticosteroids are usually used daily until physician feel that the patient can decrease the dose or stop using the medication altogether.

2.All people with asthma should receive a written asthma action plan. Asthma is a complex, potentially life-threatening condition. Treatment instructions, which include using multiple medications, responding to various stages of symptoms and making environmental changes, must be written in the patient's record and the patient should get a copy. This asthma action plan will cover routine or daily treatment as well as

recognizing and handling worsening symptoms. Every person with asthma deserves an individualized, written asthma action plan.

3. All patients should have an initial assessment that covers impairment and risk to determine the level of therapy needed.

To decide on a treatment plan, it's important to take into account how asthma affects the patient's daily activities and to assess the risk of future symptoms or life-threatening events.

4. At planned follow-up visits, asthma patients should review their level of control with their healthcare provider based on multiple measures of current impairment and future risk in order to guide clinician decisions to either maintain or adjust therapy.

Traditionally, asthma was only treated in the emergency department or when symptoms were faring beyond your ability to stop them at home. With planned, scheduled visits, patient can focus on good health and work with medical care team to learn to intervene early and hold on to the best possible breathing levels.

5. Patients who have asthma should be scheduled for planned follow-up visits at periodic intervals in order to assess their asthma control and modify treatment, if needed.

Planned follow-up visits are important. After education and conversation, the office visit turns to assessing how or if the asthma action plan should be revised - specifically, whether or not to adjust the dose and frequency of medications.

The goal: Use the least amount of medication necessary to achieve the maximum result, meaning asthma doesn't interfere with your daily life.

6. Clinicians should review each patient's exposure to allergens and irritants and provide a multi-pronged strategy to reduce exposure to those allergens and irritants that make a patient's asthma worse.

Controlling asthma symptoms involves much more than prescribing medications. That's why the guidelines direct clinicians to ask about patients exposures to common inhalants known to cause airway inflammation such as airborne particles of pet dander,

tobacco smoke, mold, dust mites, cockroaches, pollen and other pollutants at home, work, school and play.

## PHARMACOTHERAPY FOR ASTHMA <sup>48</sup>

The medications used in the treatment of asthma may be divided into two categories they are

➤ **Long-term control medications** such as

- Inhaled corticosteroids
- Leukotriene modifiers
- Long acting beta agonists
- Combination inhalers
- Theophylline

➤ **Quick-relief medications** such as

- Beta agonists
- anticholinergics
- systemic corticosteroids.

### Long term control medications

- **Inhaled corticosteroids.** These medications include fluticasone (Flovent Diskus, Flonase), budesonide (Pulmicort, Rhinocort), mometasone (Nasonex, Asmanex Twisthaler), ciclesonide (Alvesco, Omnaris), flunisolide (Aerobid, Aerospan HFA), beclomethasone (Qvar, Qnasl) and others. You may need to use these medications for several days to weeks before they reach their maximum benefit. Unlike oral corticosteroids, these corticosteroid medications have a relatively low risk of side effects and are generally safe for long-term use.
- **Leukotriene modifiers.** These oral medications — including montelukast (Singulair), zafirlukast (Accolate) and zileuton (Zyflo) — help relieve asthma symptoms for up to 24 hours. In rare cases, these medications have been linked to

psychological reactions, such as agitation, aggression, hallucinations, depression and suicidal thinking. Seek medical advice right away for any unusual reaction.

- **Long-acting beta agonists.** These inhaled medications, which include salmeterol (Serevent) and formoterol (Foradil, Perforomist), open the airways. Some research shows that they may increase the risk of a severe asthma attack, so take them only in combination with an inhaled corticosteroid. And because these drugs can mask asthma deterioration, don't use them for an acute asthma attack.
- **Combination inhalers.** These medications — such as fluticasone-salmeterol (Advair Diskus), budesonide-formoterol (Symbicort) and mometasone-formoterol (Dulera) — contain a long-acting beta agonist along with a corticosteroid. Because these combination inhalers contain long-acting beta agonists, they may increase your risk of having a severe asthma attack.
- **Theophylline.** Theophylline (Theo-24, Elixophyllin, others) is a daily pill that helps keep the airways open (bronchodilator) by relaxing the muscles around the airways. It's not used as often now as in past years.

Most people who have asthma need to take long-term control medicines daily to help prevent symptoms. The most effective long-term medicines reduce airway inflammation. These medicines are taken over the long term to prevent symptoms from starting. They don't give quick relief from symptoms. Inhaled corticosteroids are the preferred medicines for long-term control of asthma. These medicines are the most effective long-term control medicine to relieve airway inflammation and swelling that makes the airways sensitive to certain substances that are breathed in. Reducing inflammation helps prevent the chain reaction that causes asthma symptoms. Most people who take these medicines daily find they greatly reduce frequency and severity of symptoms. Inhaled corticosteroids are generally safe when taken as prescribed. They're very different from the illegal anabolic steroids taken by some athletes. Inhaled corticosteroids aren't habit-forming, even if taken every day for many years. But, like many other medicines, inhaled corticosteroids can have side effects. One common side effect from inhaled corticosteroids is a mouth infection called thrush. One can use a spacer or holding chamber to avoid thrush. A spacer or holding chamber is attached to inhaler when taking medicine to keep the medicine from landing in mouth or on the back

of the throat. Rinsing mouth with water after taking inhaled corticosteroids also can lower your risk of thrush.

## QUICK-RELIEF MEDICINES

**Quick-relief (rescue) medications** are used as needed for rapid, short-term symptom relief during an asthma attack — or before exercise if your doctor recommends it. Types of quick-relief medications include:

- **Short-acting beta agonists.** These inhaled, quick-relief bronchodilators act within minutes to rapidly ease symptoms during an asthma attack. They include albuterol (ProAir HFA, Ventolin HFA, others), levalbuterol (Xopenex HFA) and pirbuterol (Maxair). Short-acting beta agonists can be taken using a portable, hand-held inhaler or a nebulizer — a machine that converts asthma medications to a fine mist, so they can be inhaled through a face mask or a mouthpiece.
- **Ipratropium (Atrovent).** Like other bronchodilators, ipratropium acts quickly to immediately relax your airways, making it easier to breathe. Ipratropium is mostly used for emphysema and chronic bronchitis, but it's sometimes used to treat asthma attacks.
- **Oral and intravenous corticosteroids.** These medications — which include prednisone and methylprednisolone — relieve airway inflammation caused by severe asthma. They can cause serious side effects when used long term, so they're used only on a short-term basis to treat severe asthma symptoms.

All people who have asthma need a quick-relief medicine to help relieve asthma symptoms that may flare up. Inhaled short-acting beta<sub>2</sub>-agonists are the first choice for quick relief. These medicines act quickly to relax tight muscles around the airways when patient having a flare up. This allows the airways to open up so that air can flow through them. Patient should take quick-relief medicine when he or she first notices asthma symptoms. If patient use this medicine more than 2 days a week, talk with the doctor about how well controlled your asthma is. Patient may need to make changes in asthma action plan. The patient should carry quick-relief inhaler with them at all times in case they need it. If child has asthma, make sure that anyone caring for him or her and the child's school has the child's quick-relief medicines. They should understand when and how to use them and when to seek medical care for the child. Patient shouldn't use

quick-relief medicines in place of prescribed long-term control medicines. Quick-relief medicines don't reduce inflammation.

## WHAT IS SPIROMETRY?

Spirometry is a simple test to measure the amount of air a person can breath out and the amount of time to do so. This test can detect very small changes in lung function before the patient can appreciate it. This test is useful for the diagnosis and management of both COPD and Asthma.

Spirometric measurements include:

- FVC (Forced Vital Capacity):

Maximum Volume of air that can be exhaled during a forced maneuver. It is the volume of lungs from full inspiration to forced maximum expiration. Expressed as a percentage of the predicted normal for a person

- FEV<sub>1</sub> (Forced Expired Volume in One Second):

Volume Expired in the first second of maximal expiration after a maximal inspiration. This is a measure of how quickly the lungs can be emptied.<sup>50</sup>

## Spirometry

The most reliable way to determine reversible airway obstruction is with **spirometry**, a test that measures the amount of air entering and leaving the lungs. This simple test can be performed in the physician's office.

Spirometry uses a measuring device called a **spirometer** that is connected by a flexible tube to a disposable cardboard mouthpiece. The patient exhales and inhales deeply, then seals his or her lips around the mouthpiece and blows as forcefully and for as long as possible until all the air is exhaled from the lungs.

Ideally, the patient should exhale for at least 6 seconds. The spirometer measures the amount of air exhaled and the length of time it took to exhale it. The amount of air exhaled in the first second, expressed as "FEV<sub>1</sub>," is measured and compared to the total amount exhaled. If the amount exhaled in 1 second is disproportionately low to the total

exhaled, the patient has an obstruction. To test for reversibility, the patient then inhales a bronchodilator (i.e., a drug that widens the airways in the lungs) and the spirometry is repeated. If the values of the test performed after administration of the bronchodilator are significantly better than the prebronchodilator values, the obstruction is considered reversible.

Sometimes a patient with asthma does not demonstrate reversibility after the inhalation of a bronchodilator. In this case, the patient may be treated for a few weeks with anti-inflammatory medications and then returns for another spirometry test. If the post treatment spirometry results are better than the initial results, the obstruction is considered reversible.

### **Peak Expiratory Flow**

Because asthma symptoms vary, it is not unusual for a patient with chronic asthma to have normal spirometry. In such cases, **peak expiratory flow (PEF) rate** monitoring may be used to demonstrate reversible airway obstruction. A peak flow meter is a portable device that can be carried by the patient. It consists of a small tube with a gauge that measures the maximum force with which one can blow air through the tube.

The patient performs the peak flow meter test twice a day for about 2 weeks and records the results for review in a follow up appointment. The first test should be performed after waking in the morning, before taking bronchodilator medications. The patient should perform the peak expiratory flow maneuver 3 times and record the highest measurement. The second test should be done in the afternoon or early evening after taking a bronchodilator. Peak flows vary during the day and the early morning peak is lower than the evening peak. A variability greater than 20% indicates a reversible airway obstruction.

### **Bronchial Provocation**

Occasionally, a patient with a suspected asthma-related airway obstruction does not demonstrate obstruction in spirometry or peak flow monitoring. In this circumstance, the diagnosis of airway obstruction may be provided by bronchial provocation.

Bronchial provocation, also known as bronchoprovocation and bronchial challenge, identifies and characterizes hyper responsive airways by having the patient inhale an aerosolized chemical, called a broncho-spastic agonist, that triggers a hyper

responsive reaction. The chemicals most often used are histamine and methacholine.

Patients perform spirometry without inhaling the agent and then inhale increasingly higher doses of the agent. After each incremental dose inhalation, spirometry is performed. Patients who demonstrate a reduction in FEV<sub>1</sub> of 20% with a low dose of methacholine or histamine have nonspecific hyperresponsiveness. Although some patients without asthma demonstrate hyperresponsiveness, most patients with a positive reaction have asthma.

The other common bronchoprovocation test is the exercise challenge test, which is used primarily with patients whose asthma is triggered by exercise. The patient performs spirometry and then exercises, usually on a treadmill or exercise cycle. The exercise test should resemble as closely as possible the conditions under which the symptoms are usually triggered. After the patient exercises, spirometry is repeated. This may be done several times, immediately after exercise and periodically, until there is a drop in the FEV<sub>1</sub> greater than 20% or until 30 minutes have elapsed.

### **Other Asthma Tests**

Tests may be employed to exclude other diseases and to evaluate conditions that worsen the asthmatic condition. These include the following:

- **Chest x-rays** are often obtained initially to rule out other health conditions.
- **Allergy testing**, either by skin testing or by measuring antibodies in the blood, sometimes is performed to determine if the asthma is allergy induced, and if so, what specific allergens are involved.
- **X-rays of the sinuses** is often done to exclude sinusitis as a factor.
- **Evaluation for gastro-esophageal reflux disease** is often performed to evaluate its contribution to the control of asthma.

### **INTERPRETATION**

FVC is reduced in restrictive disease and also in obstructive disease if air trapping occurs. FEV<sub>1</sub> is reduced in both restrictive disease and obstructive disease.



## ECONOMIC IMPACT OF ASTHMA <sup>32</sup>

Studies done by **K.J.R. Murthy et al** have shown that majority of patients with asthma live in rural areas. As poverty levels are higher in rural areas when compared to urban, it is imperative that primary health care providers should focus mainly on preventive rather than curative care of the disease and should focus on adopting the Guidelines for the treatment and management of asthma. The mild and moderate forms of asthma can be managed successfully even by primary health care providers if they strictly follow the Guidelines in identifying cases at the early stages and prescribe medications which are less expensive and ensure quick relief to the patient. Further, as the treatment is for a prolonged period, the compliance rates would also be high if the cost of treatment is affordable, resulting in a lesser number of patients getting into the acute phase. The estimated total cost of treatment of chronic and acute cases of asthma according to current practices for 1996 to 2016 is presented in below table.

Additional cost for patients with acute asthma (Rs in crore/year)

The problem of asthma can be easily managed when it is in the mild stage. In fact, 90% of these cases are mild and can be successfully handled at primary healthcare centers. This will reduce the financial burden on the family. The remaining 10% of cases need secondary care. Below table provides the economic burden on patients with chronic and acute asthma from 1996 to 2016.

YEAR	URBAN	RURAL	TOTAL
1996	27.72	76.71	104.42
2001	44.26	122.51	166.78
2006	64.37	178.19	242.56
2011	87.55	242.36	329.91
2016	111.32	308.26	419.59

## ECONOMIC BURDEN OF ASTHMA ( RS IN CRORE)

Year	Chronic	Acute	Total
1996	960.05	167.07	1127.12
2001	1543.74	267.63	1811.37
2006	2294.73	388.84	2683.57
2011	3197.60	528.84	3726.44
2016	4180.35	672.52	4852.86

## CURRENT ISSUES IN ASTHMA MANAGEMENT

The issues associated with asthma management include patient and health care professional related issues.

### Patient related issues:

According to studies done by **Partridge MR, Osman LM and Horne** many issues in asthma management are patient-related issues associated with the inappropriate use of asthma medication. It includes the underuse of preventer medication, the overuse of reliever medication, non-adherence to treatment regimens and incorrect device use. Other patient related issues include trigger factor ignorance, worsening asthma not recognized and poor perception of asthma control.

Patients' perceptions, attitudes to and knowledge of asthma medication may influence their self-management in asthma.<sup>31,32</sup> **Fabbri LM et al** in their study shown that a poor understanding of asthma and the role of medication has been shown to lead not only to in-sufficient intake of preventer medication, but also to overuse of reliever medication that are perceived to be more useful because they provide immediate relief of symptoms.<sup>33</sup>

Studies by **Boulet LP** have revealed that a large proportion of people with asthma do not understand the role of their medications and have many misconceptions and fears in regard to inhaled corticosteroids and their side effects, reducing their willingness to use them.<sup>32,33,34</sup>

It has been shown in a study done by **Anis AH** et al that asthma patients who use medication inappropriately (specifically excessive use of short-acting beta agonists combined with underuse of inhaled corticosteroids) are at higher risk for fatal and near fatal attacks and use significantly more health care resources than patients with appropriate medication use.<sup>37</sup>

Another important patient-related issue is adherence to asthma medication. According to **Bender BG** adherence rates to asthma medication in adults are known to be poor and are frequently less than 50%.<sup>38</sup> Many studies such as done by **Garg VK** et al have shown that people with asthma are reluctant to use their asthma medication regularly as recommended. The cost of asthma medication was an issue for nearly two-thirds of the participants and as a consequence some would not take their medication as prescribed. In the US, a study found that there were still. Research to identify risk factors for non-adherence by **Mellins RB et al** has shown factors such as age, sex, objective measures of disease severity, subject's educational level, complexity of the treatment regimen, side-effects, socio-economic barriers and denial of the illness to be associated with patient's low adherence to therapy.<sup>40</sup>

Another important patient-related issue associated with medication use is the incorrect use of asthma devices. Inability to use inhalers effectively is known to adversely affect the delivery of the drug and thus minimize the benefits of inhaled medication. According to study done by **Basheti I et al**, in UK and Australia sub-optimal inhaler technique was demonstrated by 77% of patients (85% for patients using a metered dose inhaler) and patients showed a significant improvement in their inhaler technique after education.<sup>41</sup> Previous studies by **Nimmo CJ** et al, have shown that written instructions alone are not sufficient for improvements in inhaler technique to be achieved, and those verbal instructions, demonstrations and practice sessions need to be included.<sup>41,42</sup> Further, it has been shown that inhaler technique tends to decline without routine review.<sup>44</sup>

According to a study done by **Gibson PG** et al one of the most important patient related issues of asthma management is self-management of asthma by patients. Self-management involves the patient making therapeutic, behavioral and environmental adjustments in accordance with advice given to them in advance by the health care provider. It has been shown in various studies that self-management of asthma by patients can reduce hospitalizations<sup>45</sup> and should include self-monitoring, regular medical review and use of written action plan. Peak flow-based self-monitoring has been recommended for those who are poor perceivers of their symptoms.<sup>46</sup>

To improve asthma management in India, the following points need consideration:

1. Awareness of asthma as a common and debilitating condition needs to be improved by government institutions.
2. Inhaled medication should be made available through government institutions.
3. Pharmaceutical companies should come forward to supply basic inhalers, particularly the earlier introduced but effective ones at a lower cost.
4. The safety, efficacy, and necessity of inhaled steroids should be widely disseminated among the general public.
5. Simple spirometers and peak flow meters should be made available in all government institutions
6. Cost-effective and, if necessary, second-best options need to be worked out in situations where optimum treatment is not affordable or not possible for some other reason.

## **HEALTH PROMOTION AND PHARMACISTS:**

According to study by **Anderson C et al** Health promotion is an "umbrella" term used for a broad range of strategies of which health education is but one part. Health promotion is defined as any combination of interventions involving health education and related (organizational, economic, political) interventions designed with consumer participation to promote changes (social, environmental, attitudinal, behavioral)

conducive to the improvement in health of individuals or groups.<sup>47</sup> Health promotion is not just about changing lifestyle or providing information. It is also about providing services that improve the health of individuals and communities, and empowering people to have increased control and to improve their health. Community involvement, ownership and support are crucial in achieving successful health promotion.

### **ROLE OF PHARMACISTS:** <sup>20</sup>

According to NIH publication pharmacists may have contact with patients with asthma who refill their prescriptions without routine physician care or who medicate themselves with over-the-counter (OTC) asthma products. As members of the health care team, pharmacists are in an excellent position to recognize patients who are not under the care of a physician or whose asthma may be poorly controlled for a variety of reasons. Appropriate therapy and patient adherence will prevent most emergency department visits and hospitalizations for asthma. However, when Emergency Department visits or hospitalizations occur, they provide an opportunity for pharmacists to ask about the patient's treatment plan and to reinforce and clarify instructions that will help prevent the problem from recurring.

### **ACTION PLAN FOR PHARMACISTS**

1. Educate patients about asthma medications.
2. Instruct patients about the proper techniques for inhaling medications.
3. Monitor medication use and refill intervals to help  
identify patients with poorly controlled asthma.
4. Encourage patients purchasing OTC asthma inhalers or tablets to seek  
medical care.
5. Help patients use peak flow meters appropriately.
6. Help patients discharged from the hospital understand their asthma  
management plan.

## 1. ACTION PLAN FOR PHARMACISTS

2. There are numerous areas where pharmacists can contribute to improving health outcomes in patients with asthma. Pharmacists can:

### 3. 1. Educate patients about the role of each medication.

4. Pharmacists can help patients understand that, with appropriate therapy, most patients can lead normal, productive, and physically active lives. Pharmacists can educate patients about the two broad categories of asthma medications:

5. Medications used to prevent and/or decrease the frequency of symptoms.

6. Preventive medication should be taken on a regular basis even when the patient is free of symptoms. This type of long-term medication includes inhaled anti-inflammatory agents such as corticosteroids, commonly, and nedocromil, which are preferred therapy. It may include extended-release formulations of theophylline. Also included as long-term medication are extended-release oral and long-acting inhaled beta2-agonists, which are added to inhaled corticosteroids when the recommended doses of inhaled corticosteroids are not sufficient to control chronic symptoms, especially nighttime symptoms. Preventive long-term medication also may include, for severe asthma, alternate day oral corticosteroid therapy. In addition, the use of a short- or long-acting inhaled beta2-agonist or commonly before exercise to prevent exercise-induced bronchospasm falls into the "prevention" category.

7. Medications taken to relieve asthma symptoms.

8. Medications in this category are designed to relieve symptoms and generally are prescribed to be taken only as needed (PRN). This therapy includes primarily short-acting inhaled beta2-agonists (albuterol, bitolterol, pirbuterol, or terbutaline). In addition, a short course of oral corticosteroids for patients who are not fully responsive to inhaled bronchodilators may be used to treat acute exacerbations of asthma. An effective asthma management plan should ensure that the patient is given written and verbal instructions that describe when and how a medication should be taken, how much to take, how to evaluate the response to therapy, when to seek medical care, and what to do when the desired effect is not achieved or side effects are encountered. Pharmacists can reinforce these instructions by reminding patients, for example, to

contact their physician when acute symptoms are not relieved by using their short-acting beta2-agonist inhaler as directed or when their peak expiratory flow rate (PEFR) drops below a predetermined value.

**9. 2. Instruct patients about the proper techniques for inhaling medications**

10. Inhaled medications are preferred over oral therapies. However, a major limitation in their effectiveness is the patient's ability to use the device appropriately.

11. Improper MDI technique can be one cause of a poor response to therapy. Pharmacists can play an important role on the health care team by teaching patients with asthma about proper medication technique. Other devices, such as dry powder inhalers, breath-actuated inhalers, and nebulizers, are also available, and they require different techniques for administration. A placebo inhaler, which can be obtained from pharmaceutical manufacturers, and instructional videos may be useful in demonstrating proper technique.

12. Patients using inhalation therapies need careful instruction, including step-by-step demonstration at the time of dispensing the medication, and observation of their technique. Because inhaler technique tends to decline without routine review, pharmacists should reassess a patient's technique when prescriptions are refilled or renewed. Patients should be reminded that the most important steps in a proper MDI technique are gentle exhalation before breathing in, a slow inhalation, and holding the breath.

13. Pharmacists also should assess whether using a valved spacer device with an MDI would be helpful. Spacers may be beneficial to any patient, but they are indicated especially for the patient who cannot master the optimal inhaler technique. Spacers are routinely indicated for most patients using a corticosteroid MDI because they improve particle deposition in the lungs and decrease local side effects such as thrush and hoarseness. In children too young to use an MDI attached to a spacer device, a 'compressed air-driven nebulizer can be used to administer medications.

**14.**

**15.**

**16.**

### **17. 3. Monitor medication use and refill intervals to help identify patients with poorly controlled asthma.**

18. American Academy of Allergy and Immunology reported that during symptomatic periods, selective short-acting inhaled beta2-agonists may be sufficient to relieve asthma symptoms. When asthma is stable, it is preferable to use these agents on an as-needed basis. Overuse and overreliance on short-acting inhaled beta2-agonists can be signs that asthma is poorly controlled. During an exacerbation, patients may increase the dose and/or frequency of use, which may lead to a delay in seeking appropriate medical care. Pharmacists may find indications of chronic overuse of short-acting inhaled beta2-agonists by checking patients' medical history and the frequency of refills. Overuse can be defined as using more than one canister per month of a short- or long-acting beta2-agonist or more than one canister of a short-acting beta2-agonist in 2 months when used in conjunction with a long-acting agent. Pharmacists should also monitor for overuse of a long-acting beta2-agonist (e.g., salmeterol). In general, these agents should not be used more than twice a day and are not appropriate to relieve acute symptoms. If overuse is noted, pharmacists should alert the physician, who can assess the need for reevaluation of the patient and consider whether the patient needs to initiate or intensify anti-inflammatory therapy. Before contacting the physician, pharmacists should have the patient demonstrate his or her MDI technique. Poor technique may be one of the causes of overuse of an MDI. The physician will find this information useful in making a decision on how to respond to the situation. Physicians also may want to evaluate recent trends in peak flow meter readings. Physicians will consider several factors when deciding whether to initiate or increase anti-inflammatory therapy. In general, a short course of oral corticosteroids may be indicated if the excessive use of an MDI is (1) short term; (2) due to an acute, severe episode; or (3) the result of an isolated exacerbation caused by a common cold or other upper respiratory tract infections. The initiation or dose increase of an inhaled anti-inflammatory agent (corticosteroids, commonly or nedocromil) as long-term therapy may be indicated if the patient relies on short-acting inhaled beta2-agonists daily to relieve symptoms, has frequent fluctuations in the peak expiratory flow rate, or has other signs of poorly controlled asthma.

19. Patients on preventive therapy for asthma also should be monitored for signs of non-adherence to anti-inflammatory therapy. In some cases, patients do not adhere to anti-inflammatory therapy because they do not understand the purpose of or



perceive any immediate benefit from this therapy. Some patients may be discouraged about following their prescribed regimen because they fear adverse reactions to the medications. Refilling the prescription at intervals longer than indicated by the directions for use on the prescription may indicate non-adherence.

**20. 4. Encourage patients purchasing OTC asthma inhalers or tablets to seek medical care.**

21. Asthma is one of the very few potentially fatal diseases for which OTC products are available for self-treatment. Use of OTC inhalers may lead to a delay in seeking appropriate medical care. Pharmacists should refer anyone using an OTC product for respiratory symptoms to a physician for diagnosis, regular monitoring, and proper treatment. The physician can then determine the need for other therapies, such as an inhaled anti-inflammatory agent to prevent symptoms. Over-the-counter inhalers contain epinephrine, which is a nonselective, weak, and extremely short-acting bronchodilator. Thus, if physicians determine that the PRN use of an inhaled bronchodilator is indicated, they can prescribe a selective short-acting inhaled beta2-agonist that will provide greater efficacy and a longer duration of action. Oral OTC asthma medications contain ephedrine or a combination of ephedrine and theophylline. Generally, bronchodilators are less effective and cause more side effects when administered by the oral route, and combinations of theophylline and ephedrine have the potential to cause synergistic toxicity.

**22. 5. Help patients use peak flow meters appropriately.**

23. It is recommended that clinicians consider peak expiratory flow rate monitoring for patients over 5 years of age with moderate or severe asthma. Regular home monitoring may detect decreased lung function and a sign of an impending asthma episode before it becomes more severe. The PEFr is the greatest flow velocity that can be obtained during a forced expiration starting with fully inflated lungs. It provides a simple, quantitative, and reproducible measure of airway obstruction with a relatively inexpensive device that is available without a prescription. Measuring PEFr in a patient with asthma is analogous to measuring blood pressure with sphygmomanometer or blood glucose to guide insulin dosage. The PEFr is used by the physician to assess the severity of asthma as a basis for adding medication, monitoring response to chronic therapy, and detecting deterioration in lung function before symptoms develop. The physician may

consider more aggressive therapy if the patient's highest value is less than 80 percent of predicted value and/or daily variability is more than 20 percent. Pharmacists should discuss the following items with patients: (1) the intended purpose of a peak flow meter and (2) how to use it and record the values. The patient's physician should develop an individualized plan for the use of the peak flow meter. The plan should include a threshold value and instructions on what the patient should do if the PEFV drops below this value (e.g., increase medication, call the physician, or seek emergency medical care).

#### **24. 6. Help patients discharged from the hospital after an asthma exacerbation understands their asthma management plan.**

25. Every patient being discharged from the hospital for the treatment of acute asthma should receive and understand an individualized asthma management plan. An asthma management plan should include specific written instructions for patients and families. Hospital pharmacists can discuss such a plan with a patient before discharge, reinforcing and clarifying instructions that have been designed to prevent subsequent hospitalizations or emergency department visits. Pharmacists also can review the patient's inhaler and peak flow meter technique and provide instruction, if needed.

#### **26. ASTHMA CONTROL TEST <sup>6</sup>**

27. Only few of the previous studies by **E. Mehuys et al** used asthma control as the main clinical outcome measure. They mainly used peak expiratory flow or asthma severity as the primary outcome. Several of these studies investigated only certain aspects of asthma control.<sup>6</sup>

28. Furthermore; none of the previous studies in India used asthma control as the main clinical outcome measure. However, current GINA guidelines recommend evaluating all aspects of asthma control, which is necessary to gain a complete view of the patients' asthma-control level, with a clinically validated measure. For these reasons, it's necessary to design a feasible intervention focused only on ensuring that patients use their prescribed drug therapy in the correct way (i.e. correct inhalation technique and good medication adherence).

29.

30. Several standardized measures for assessing clinical control of asthma have been developed, which score the goals of treatment as continuous variables and provide numerical values to distinguish different levels of control. Examples of validated instruments are the Asthma control questionnaire, Asthma Control Test, asthma therapy assessment questionnaire and asthma control scoring system. To ensure that the intervention agreed with the new GINA guidelines, the Asthma Control Test was used as a rapid and easy tool to determine the level of asthma control of patients presenting at community health center and to provide targeted pharmacist advice.

### 31. **ASTHMA AND QUALITY OF LIFE**

32. **Greer et al** in his study reported that the need for outcome measures other than morbidity or mortality has been obvious for years. It is, however, very important to avoid simplistic approaches to quality of life. 104 Clinicians and methodologists should have consensus on the definition of quality of life and the core component variables. Quality of life instruments provide physicians with valuable information yet these tools are not intended to replace clinical judgment. Quality of life instruments assist with the structuring and transmission of clinical information, which actually enhances their credibility. Asthma is a disease that imposes a huge burden on the well-being of patients and society as a whole. Quality of life explores general well-being from the different domains of physical status, psychological impact, and social interactions.<sup>105</sup> Quality of life reflects the perceptions and adaptations to the functional consequences of a chronic disease like asthma. Clinical and functional variables arguably are only an impairment that is secondary to chronic conditions. According to study done by Bousquet et al asthma is a chronic condition in which social life is altered. The importance of these restrictions on social life can be illustrated by the impairment suffered by subjects with severe disease or uncontrolled symptoms.<sup>10</sup> It is equally well known that people usually only consult their physician once their quality of life is affected by their disease<sup>106</sup> Asthma treatment is directed towards the improvement of a patient's health and well-being. Measurements of airways functioning (spirometry) do not always reflect the amount of disease activity present in the airways. Spirometry correlates poorly with health and patients care is complicated by the fact that physicians use different criteria to estimate health.

**Jones et al** in their study reveal that Quality of life questionnaires provide a method of quantifying the effect of disease on a patient's life. These instruments have the potential to identify a threshold response to treatment that may be considered worthwhile and allow for comparisons between therapeutic strategies with regard to the health gain each strategy provides.<sup>10</sup> A basic principle of quality of life measurement is that it should be assessed from the view of the patient. Research evidence suggests that the patient's view of health may change as the disease progresses and they adjust their perception of what "normal" entails. A strength of quality of life instruments is their ability to give a valid global assessment of the overall effect of the disease on the patient's health and the fact that they have considerable potential to quantify the magnitude of health gains from therapeutic strategies. Objections are that these outcome measures do not satisfy accepted criteria for measurement instruments such as sensitivity, reliability, validity, responsiveness and acceptability. There is an emerging need for measurement instruments that will capture changes that are important to patients, particularly changes in the quality of life. A person's quality of life is an important factor to be considered in making decisions regarding effectiveness of treatment. Quality of life measures provide an opportunity to consider treatment impacts in various domains: physical, emotional and social. This, in turn, allows researchers to advance their understanding of underlying biological and social processes. Quality of life instruments may also be able to detect small, but important differences that would otherwise remain undetected by less responsive instruments.

### **33. The purpose of Measuring Quality of Life**

34. Quality of life measures are important when clinical decisions are made. Patients should be engaged in the process of making treatment choices. Measuring quality of life at a population level helps policymakers to appreciate population trends when allocating funds. Quality of life outcomes provide a broader perspective showing the benefits and satisfaction patients derive from their treatment. This includes monitoring of change over time and assesses relative impact of alternative treatments. Quality of life changes can help to monitor the impact of a change in health-care services on populations under investigation. Quality of life information is also frequently used by

the pharmaceutical industry and regulatory authorities to decide which drugs or treatment devices should be developed and marketed, and to assess the relative benefits of various treatment options. Quality of life assessments as a measure of the effect of disease on a patient's health and well-being are considered important tools in clinical studies on asthma.

35. The current respiratory symptoms were associated with impaired quality of life in patients with mild to moderate asthma. Any level of symptom severity had some effect on quality of life, even in people with occasional symptoms. Although men and women had the same level of symptom severity, women reported a poorer quality of life in comparison to their male counterparts.

36.

## AIM AND OBJECTIVE

Irrespective of a better understanding of the pathophysiology of asthma and its related therapeutic regimes, the disease still escalates in prevalence and severity. According to literatures, a positive relation exists between self-management and quality of life. However self-management can only be implemented successfully if patients have enough knowledge. To comprehend the gaps in asthma management, an assessment has to be made of the impact of asthma on the individuals suffering from the disease. Knowledge about asthma and asthma therapy affects asthma control and, ultimately, the quality of life of an asthma sufferer. If health professionals can promote appropriate self-care methods the outcome may be a relief on the healthcare system, with less hospitalization for asthma, emergency department visits and presentation at outpatients departments.

As studies show that many of the issues that still remain in asthma management are patient related issues associated with the inappropriate use of medication, community pharmacists are ideally placed to provide services that will help improve asthma management practices in the community. Pharmacists are in a key position to provide ongoing screening, counseling, monitoring, and education and to reinforce key messages and provide referrals in view of their therapeutic expertise, accessibility, regular contact with patients and contact with patients who do not see other health care providers on a regular basis. They are the last health care professional that the patient sees before they start using their medication.

Also large number of patients in rural areas have not yet benefited from the advances in asthma treatment and are still insufficiently controlled, placing severe limits on daily life and putting them at risk for asthma-related morbidity and mortality. So my aim of this study was to assess asthma patient's awareness about disease, medication and disease management; to study the quality of life of these patients and ultimately to study the influence of pharmacist provided education on treatment outcomes.

## PLAN OF WORK

The present dissertation work was planned to conduct a **"Impact of pharmacist intervention on health promotion activities in asthmatic patients "** and was planned to be conducted in St.Thomas Hospital, Kollam (District)

### **The plan of work includes:**

- I. Submission of the protocol for getting the approval from ethical committee.
- II. To get the consent letter from patients.
- III. Select the asthmatic patients for the study.
- IV. To design a data collection form
- V. To collect the case histories of the asthma patients.
- VI. To divide the patients in two group randomly, control and test groups, where the test were educated and control receives education only at the end of the study.
- VII. Select monitoring parameters.
- VIII. To evaluated the efficacy profile of drugs.
- IX. Carrying out statistical analysis and recorded.

## MATERIALS AND METHODS

### STUDY DESIGN

This study is a prospective observational study.

### STUDY SETTING

The study was carried out on asthma patients visiting the outpatient department in St. Thomas Hospital at Kollam district. It is one of the reputed Hospital in Kollam district. Majority of patients come from the surrounding rural areas.

Every day approximately 60 patients visit the clinic of which a minimum of 8 patients are asthmatic. Altogether a total of six physicians, fifteen nursing staff, five pharmacists and five paramedical staffs are providing outpatient services in this center.

### SOURCE OF DATA

The required data was collected from the following sources.

- Asthma education profile form containing patient's demographic details and knowledge questionnaire
- GlaxoSmithKline (GSK) Belgium Asthma control test
- Juniper mini asthma quality of life questionnaire
- Spirometric Evaluation
- Impact of Drug

### POPULATION SIZE

A total of 105 patients were enrolled for the study. The patients were randomly divided into 2 groups, control group and the intervention group. Randomization into control and intervention group was carried out using block randomization method. Block randomization method was designed to randomize patients into groups that result in equal sample sizes.

### INCLUSION CRITERIA

1. Age between 18-60 years.
2. Suffering from asthma disease and those having Asthma Control Test score between 15 and 25.

### EXCLUSION CRITERIA



1. Suffering from other severe diseases.
2. Having ACT score < 15 (indicating seriously uncontrolled asthma) or = 25 (completely controlled asthma, no room for improvement).
3. Pregnancy patients and lactating mothers.

### **STUDY PERIOD**

Study was conducted for a period of 6 months

(February 2013 to July 2013)

### **ETHICAL APPROVAL**

The Institutional human ethical committee of MGR University approved the study.

### **INFORMED CONSENT**

A suitably prepared consent form was used for the purpose of the study.

## METHODOLOGY

### STATISTICAL ANALYSIS

Statistical analysis was undertaken with the aid of a statistician. Data was entered onto a spreadsheet by the investigator. Frequency, mean and standard deviation were computed.

### DATA COLLECTION TOOL

For the purpose of the study, three instruments were fused and used for data gathering purposes

#### 1. Knowledge regarding asthma

Knowledge regarding asthma was assessed by means of a validated questionnaire (Asthma education profile questionnaire). A series of statements about asthma and its management were assessed.

#### 2. Control of asthma

Control of asthma was measured by means of a validated questionnaire (Asthma Control Test), developed by GlaxoSmithKline (GSK) Belgium.

Subjects included were nocturnal awakening, asthma symptoms, shortness of breath, wheezing and intake of short acting beta stimulants.

#### 3. Quality of life

Quality of life was measured by means of a validated disease-specific questionnaire developed by Juniper. Domains such as symptoms, activity, environment and emotion were measured.

#### 4. Spirometric Evaluation

FVC & FEV<sub>1</sub> values are taken to assess the lung capacity of asthmatic patients.

#### 5. Impact of Drug

The effectiveness of each drug in patient under two groups should be monitored.

The Asthma Control Test (ACT) was filled out by patients at the baseline and after first and final follow up. The patient's demographic details were recorded in a suitably designed data collection form. In order to assess the knowledge of the enrolled patients, a suitably designed questionnaire, was administered at baseline and at the final follow up. In case of patients using inhalers, their inhaler usage technique was assessed. The Quality of life of patients was evaluated by Juniper mini asthma quality of life questionnaire at the baseline and at each follow up. In the final follow-up the effectiveness of lung capacity in the asthmatic patients can be assessed on the basis of spirometry and drug impact study.

Patients in the test group were educated through verbal instructions and by providing information leaflets. Whereas the patients in control group received education only at the end of the study.

Four follow ups were conducted after the baseline with 15 days gap between each follow-up.

## **PATIENT COUNSELLING**

1. Educate patients about the role of each medication.
2. Instruct patients about the proper techniques for inhaling medications.
3. Monitor medication use and refill intervals to help identify patients with poorly controlled asthma.
4. Help patients use peak flow meters appropriately.
5. Encourage patients purchasing OTC asthma inhalers or tablets to seek medical care.
6. Help patients discharged from the hospital after an asthma exacerbation understands their asthma management plan.
7. Patients allergic to pollens have to avoid contact with it. It is important that they should keep all car and house windows closed and use the air conditioning
8. Pets that have fur or feathers often cause allergy troubles. patients have to avoid pets out of home.

## **OBSERVATION AND RESULTS**

### **STATISTICAL ANALYSIS**

Student t test was used to assess the statistical significance of the results. P value < 0.05 was considered as statistically significant.

### **RESULTS**

A total of 114 asthma patients, who met the inclusion criteria were, enrolled this study. These patients were randomized in to test (57 no.s) and control (57 no.s) groups respectively. Of 114 enrolled patients. 105 patients completed the study. Among them 53 patients in test group and 52 patients in control group have completed all the follow ups. The remaining 9 patients (5 patients in control and 4 patients in test) were considered as dropouts because these patients did not come for follow-ups.

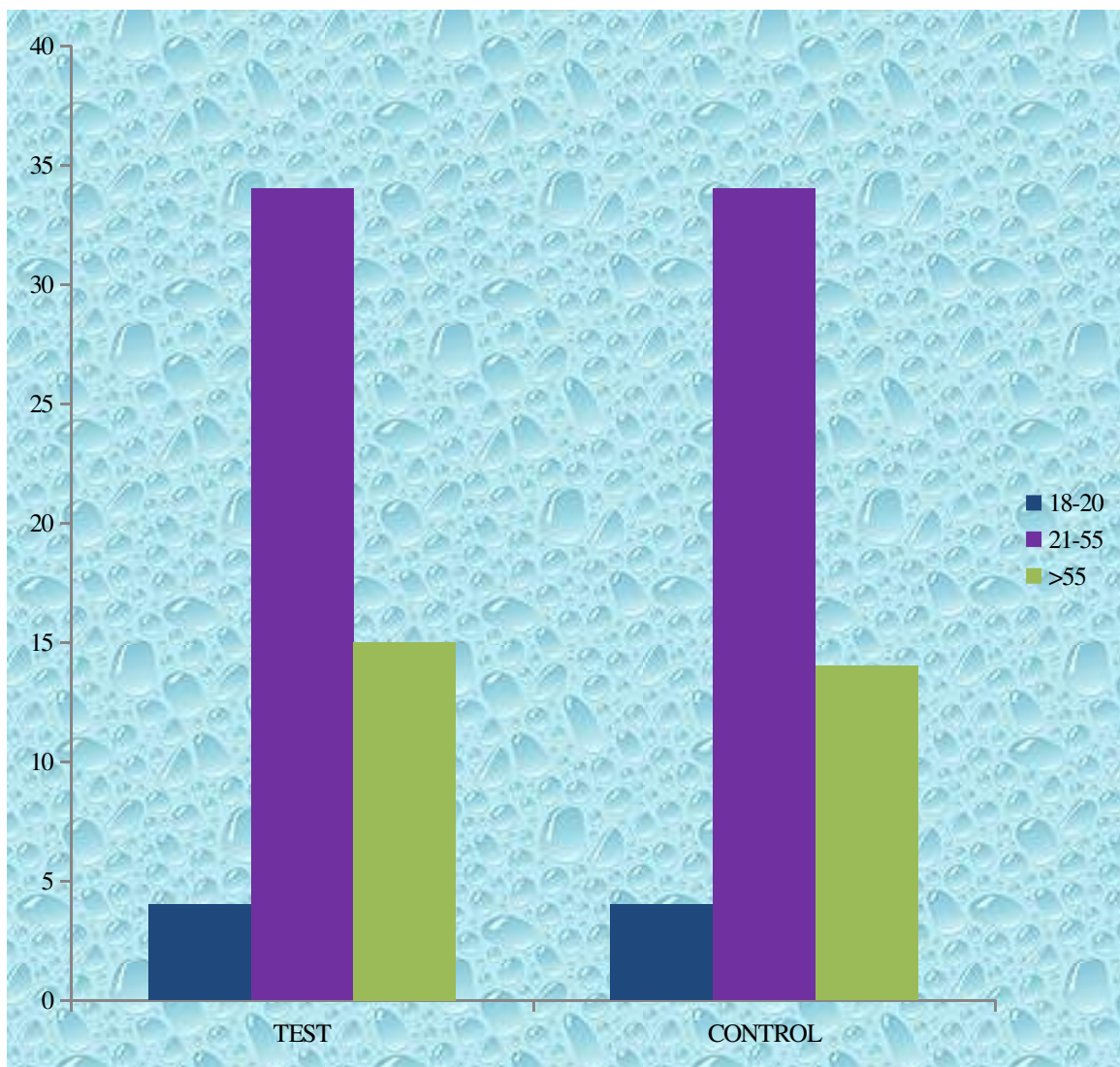
**PATIENT DEMOGRAPHICS**

No statistically significant difference was observed in the demographics of the enrolled patients with respect to age, gender, education, smoking history, occupation, treatment regimen and duration of asthma were similar in patients of both groups. Patient demographic details are presented below:

**PATIENT DEMOGRAPHICS RESULTS****AGE (BASELINE)**

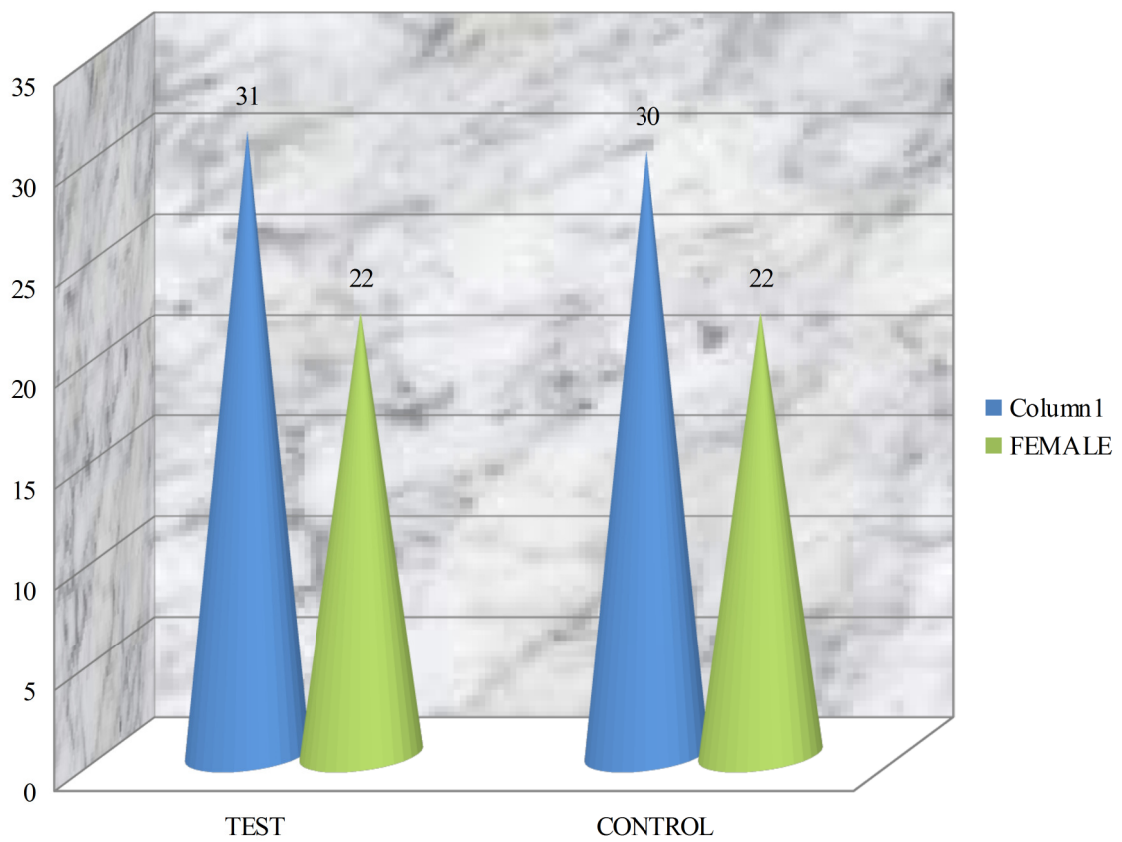
<b>AGE</b>	<b>TEST</b>	<b>CONTROL</b>
18-20	4	4
21-55	34	34
>55	15	14

**GRAPHICAL REPRESENTATION OF AGE DISTRIBUTION:**



**GENDER (BASELINE)**

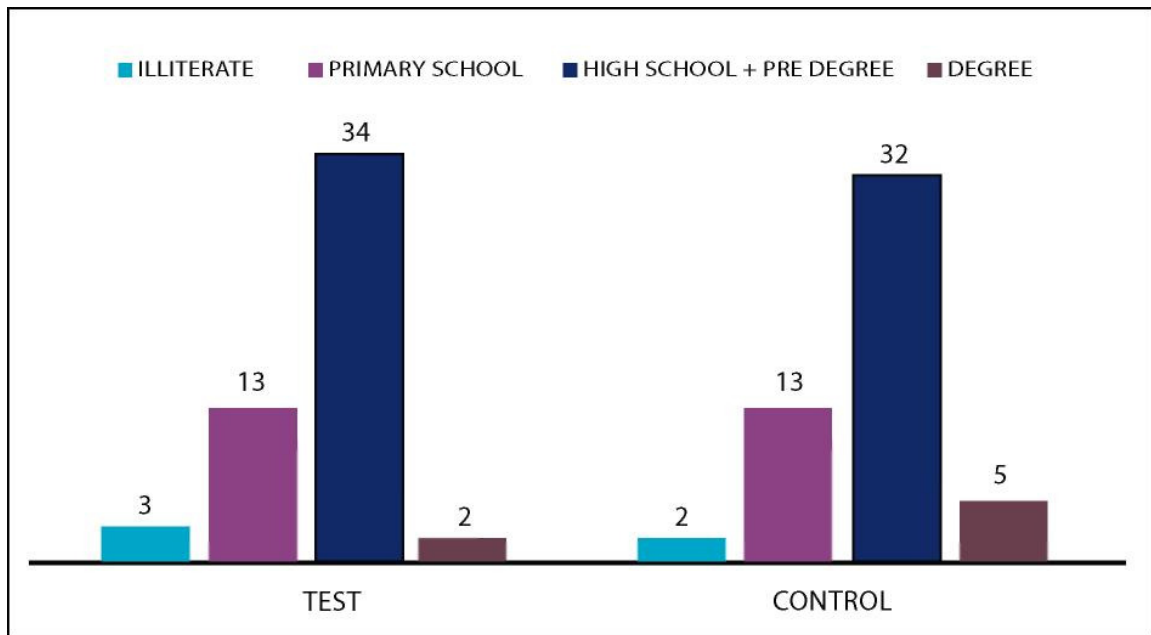
<b>Gender</b>	<b>Test</b>	<b>Control</b>
Male	31	30
Female	22	22



**EDUCATION (BASELINE)**

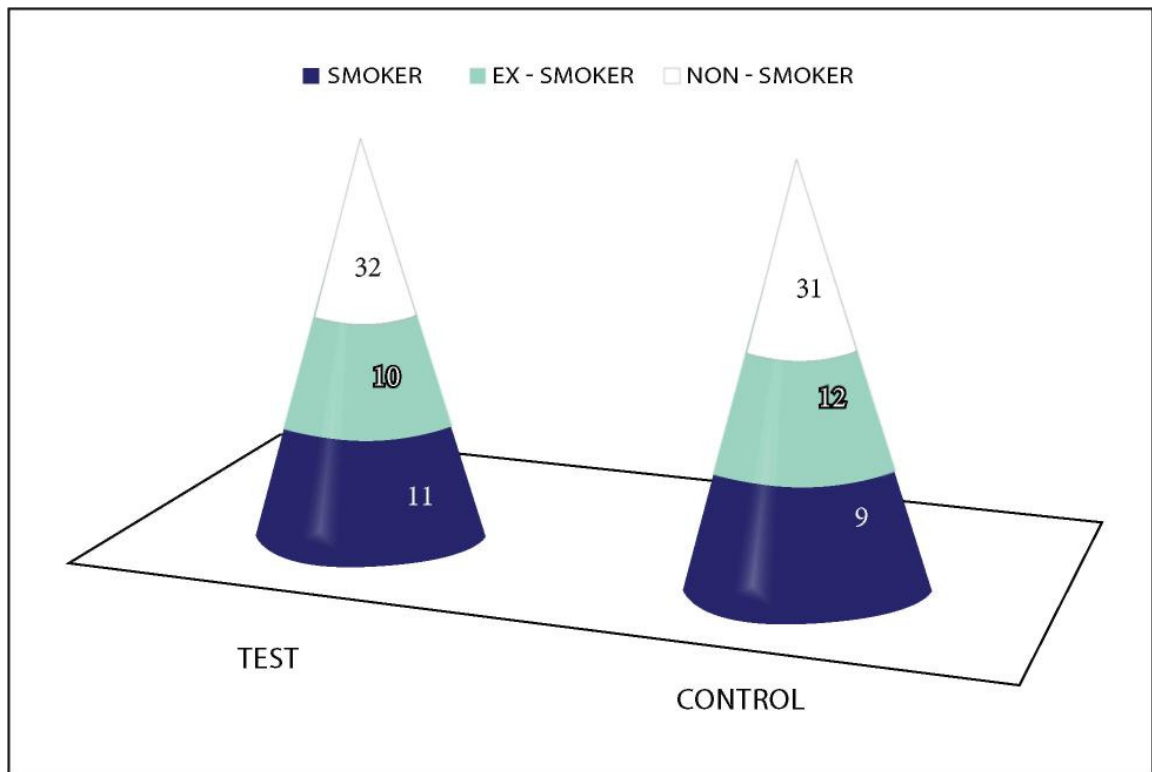
<b>Educational Status</b>	<b>Test</b>	<b>Control</b>
Illiterate	3	2
Primary School	13	13
High School + Pdc	34	32
Degree	2	5





### SMOKING HISTORY (BASELINE)

Smoking History	Test	Control
Smoker	11	9
Ex-Smoker	10	12
Non Smoker	32	31

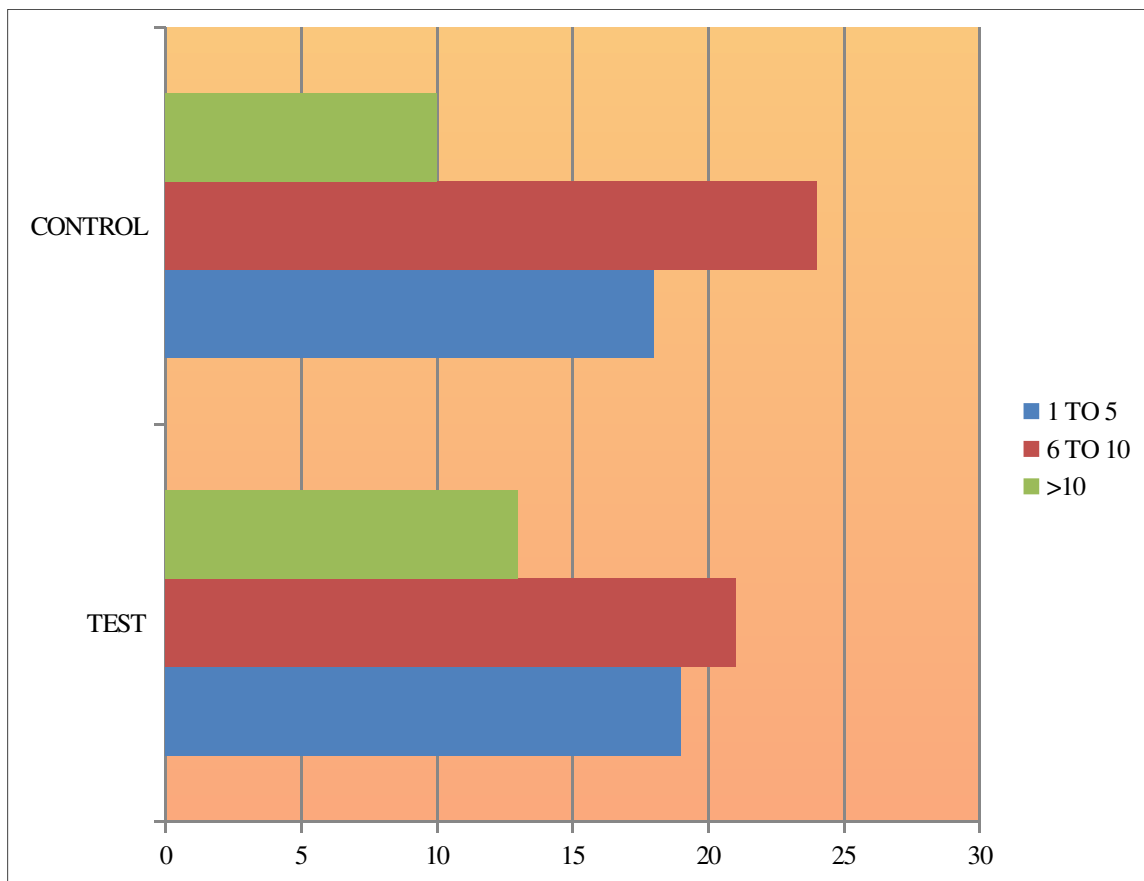


### DURATION OF ASTHMA (BASELINE)

DURATION(IN YRS)	TEST	CONTROL
1-5	19	18
6-10	21	24

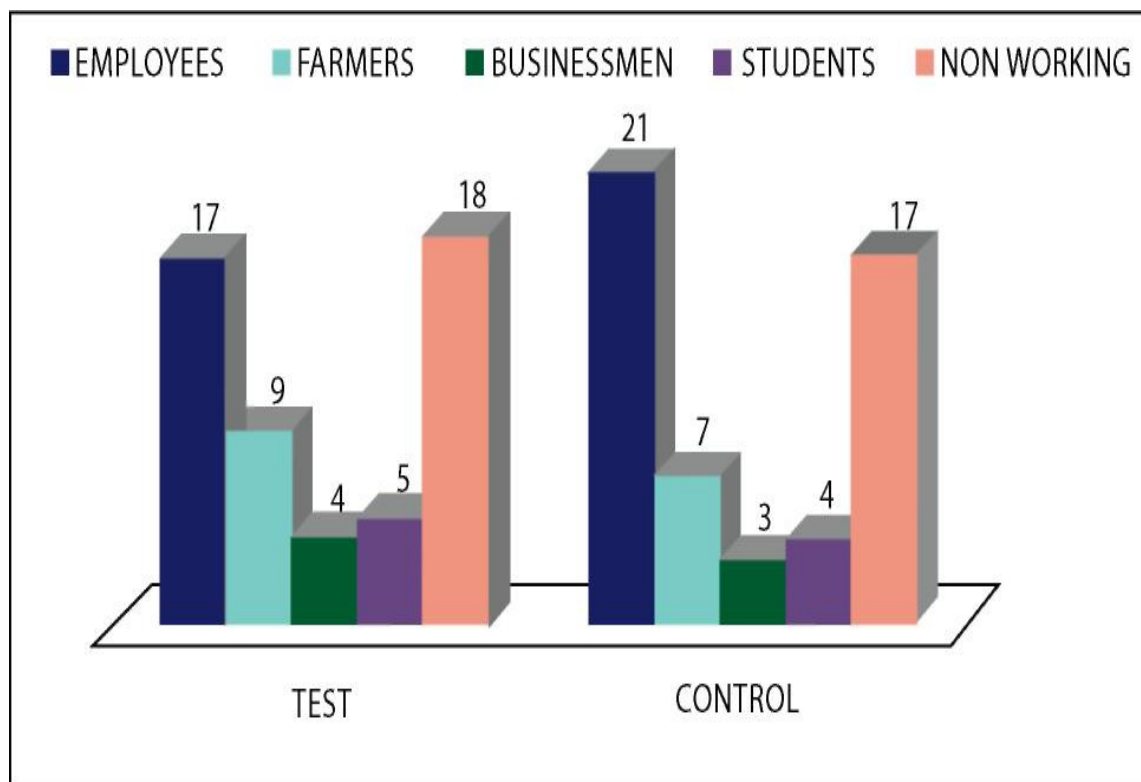
<b>&gt;10</b>	<b>13</b>	<b>10</b>
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### GRAPHICAL REPRESENTATION OF DURATION OF ASTHMA (BASELINE)



**OCCUPATION (BASELINE)**

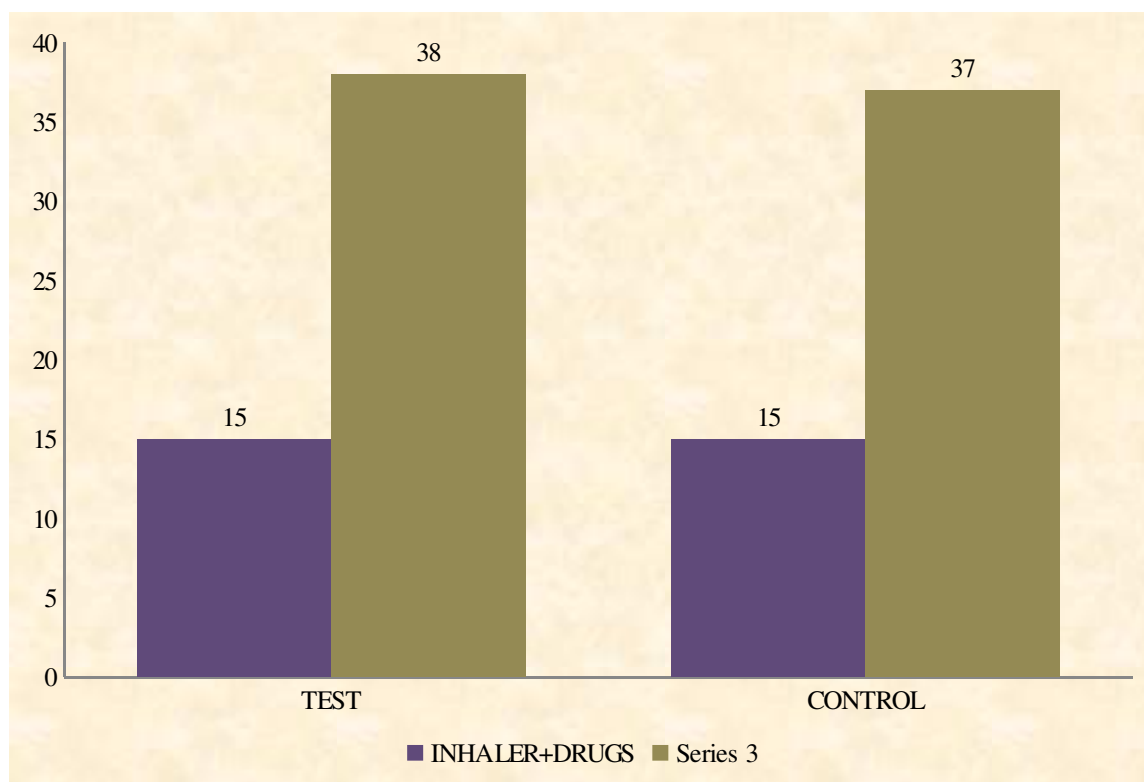
<b>EDUCATIONAL STATUS</b>	<b>TEST</b>	<b>CONTROL</b>
Employee	17	21
Farmer	9	7
Businessmen	4	3
Student	5	4
Non Worker	18	17



**TREATMENT REGIMEN (BASELINE)**

\

<b>TREATMENT REGIMEN</b>	<b>TEST</b>	<b>CONTROL</b>
INHALER+DRUGS	15	15
DRUGS ONLY	38	37



## ANALYSIS OF KNOWLEDGE RESULTS

The analysis of knowledge results was assessed by the percentage of patients answered each item correctly at baseline and at final follow-up (before and after the education). The percentage improvement of knowledge of patients in test group was observed high compared to the control group. The results are shown in table below:

Sl No.	Questions	Percentage of Patients Answered Correctly (At Baseline)				Percentage Of Patients Answered Correctly (At Final Follow Up)				Percentage Improvement (%)	
		Control (N=52)		Test (N=53)		Control (N=52)		Test (N=53)		Control	Test
		N	%	N	%	N	%	N	%		
1	Are you concerned about family members getting asthma?	6	11.53	5	9.43	11	21.15	28	52.83	9.62	43.4
2	Does asthma affect your lifestyle?	15	28.84	18	33.96	21	40.38	29	54.71	11.54	20.7
3	Are you aware of any effective treatments for asthma?	12	23.07	11	20.75	27	51.92	41	77.35	28.85	56.6
4	Do you think you can do anything to improve control of your asthma	10	19.23	9	16.98	22	42.30	42	79.24	23.07	67.92
5	Do you know what is happening in your airways?	7	13.46	6	11.32	15	28.84	22	41.50	15.38	30.18
6	Do you know what things cause your asthma to get worse?	15	28.84	10	18.86	23	44.23	43	81.11	15.39	62.25
7	Do you know how to avoid things that make your worse?	7	13.46	8	15.09	16	30.76	45	84.90	17.3	69.81
8	Which medications do you use?	21	40.38	23	43.39	38	73.07	44	83.01	32.69	39.62

Sl No.	Questions	Percentage of Patients Answered Correctly (At Baseline)				Percentage Of Patients Answered Correctly (At Final Follow Up)				Percentage Improvement (%)	
		Control (N=52)		Test (N=53)		Control (N=52)		Test (N=53)		Control	Test
		N	%	N	%	N	%	N	%		
9	Do you know what each of your medications does?	5	9.61	4	7.54	15	28.84	43	81.11	19.23	73.57
10	Do you ever forget to take your drugs?	10	19.23	12	22.64	23	44.23	41	77.35	25	54.71
11	Do you know how to use your inhalers properly?	2	13.33	3	20	2	13.33	13	86.66	0	66.66
12	Do you rinse your mouth after using inhalers?	5	33.33	6	40	5	33.33	15	100	0	60
13	Do you know how to control asthma by looking for symptoms of worsening asthma	11	21.15	9	16.98	22	42.30	32	60.37	21.15	43.39
14	Do you have a peak flow meter?	0	0	0	0	0	0	0	0	0	0
15	Are you confident you can usually manage your asthma symptoms?	11	21.15	9	16.98	26	50	43	81.13	28.85	64.15
16	Are you confident you can prevent your asthma symptoms from becoming severe?	11	21.15	12	22.64	26	50	53	100	28.85	77.36
17	Are you confident you know what to do when your asthma becomes worse?	11	21.15	10	18.86	26	50	45	84.90	39	66.3
18	Do you know when your asthma is getting worse?	7	13.46	6	11.32	11	21.1	47	88.67	7.69	77.35

In Asthma education profile questionnaire more than 50% improvement was shown by test group on questions regarding symptoms, triggering factors, methods to



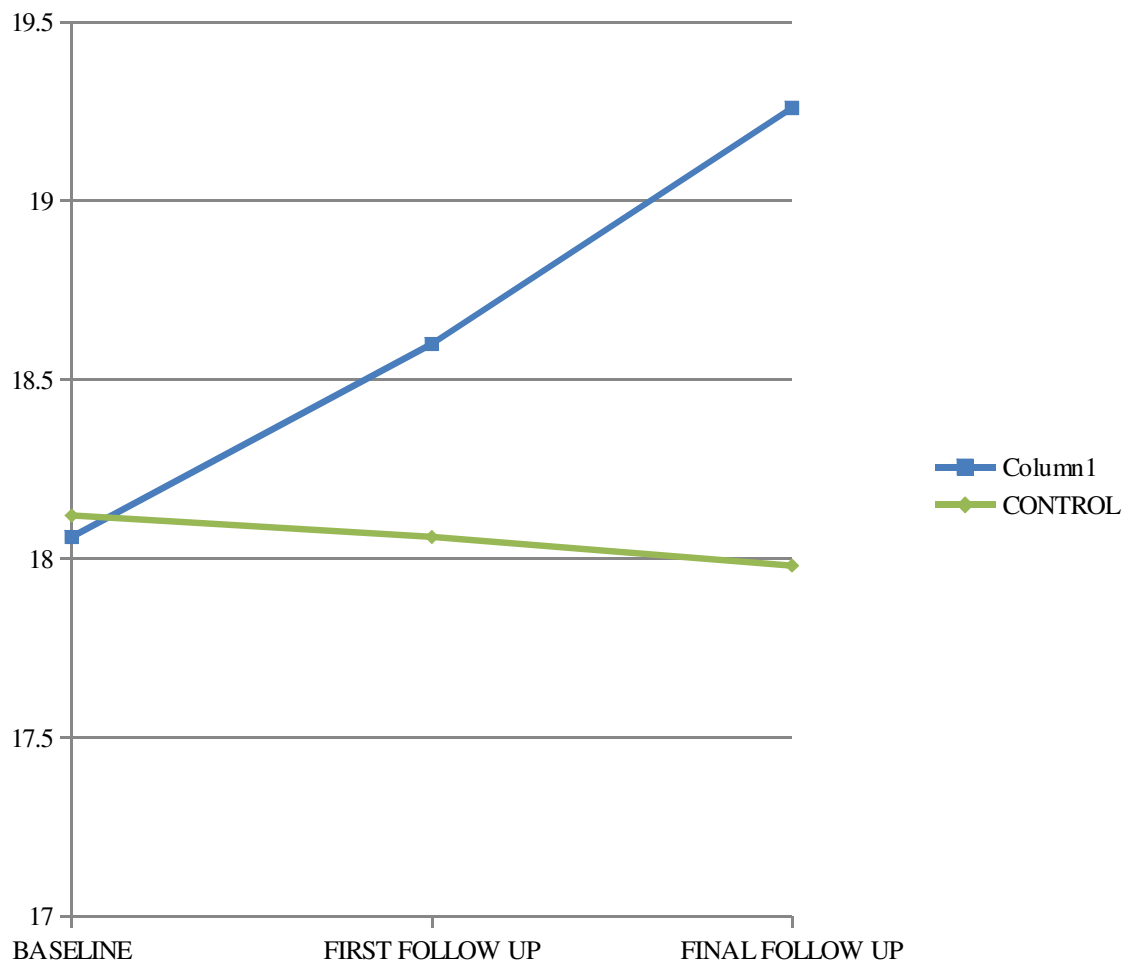
avoid them and also proper use of inhalers.

## ANALYSIS OF KNOWLEDGE RESULTS

At baseline and in 1st follow up, no significant ( $p > 0.05$ ) difference was observed in ACT scores of test and control groups. But in the final follow up, the scores of test group was significantly improved compared to the control group. The scores are given in table below:

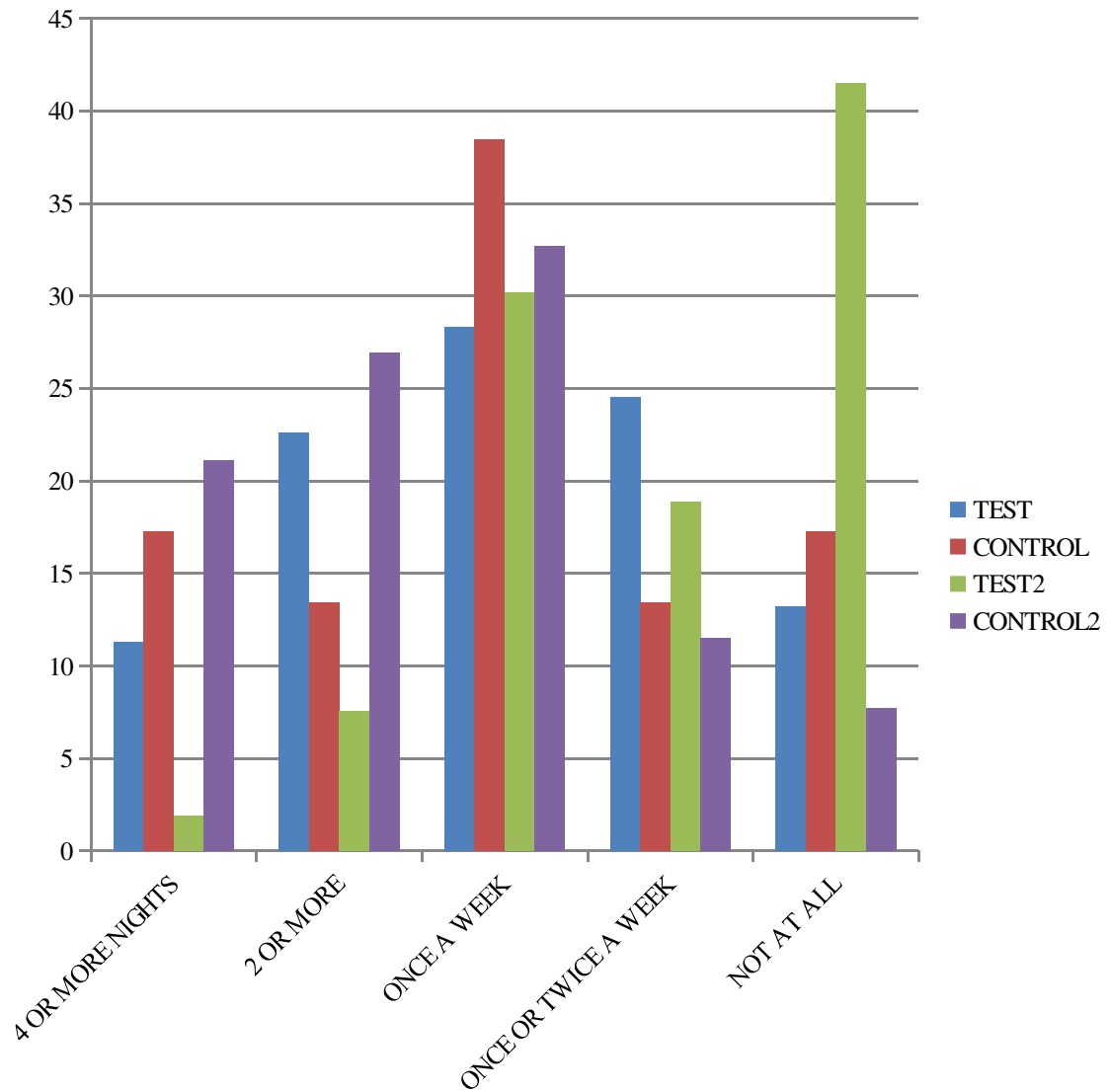
	test(mean $\pm$ SD)	Control (mean $\pm$ SD)	p value
<b>Baseline</b>	18.06 $\pm$ 2.96	18.12 $\pm$ 3.10	0.955
<b>First follow up</b>	18.60 $\pm$ 3.08	18.06 $\pm$ 3.23	0.499
<b>Final follow up</b>	19.26 $\pm$ 3.01	17.98 $\pm$ 3.31	0.040

### ANALYSIS OF KNOWLEDGE RESULTS



**NIGHT TIME AWAKENING AS PER ACT SCORE**

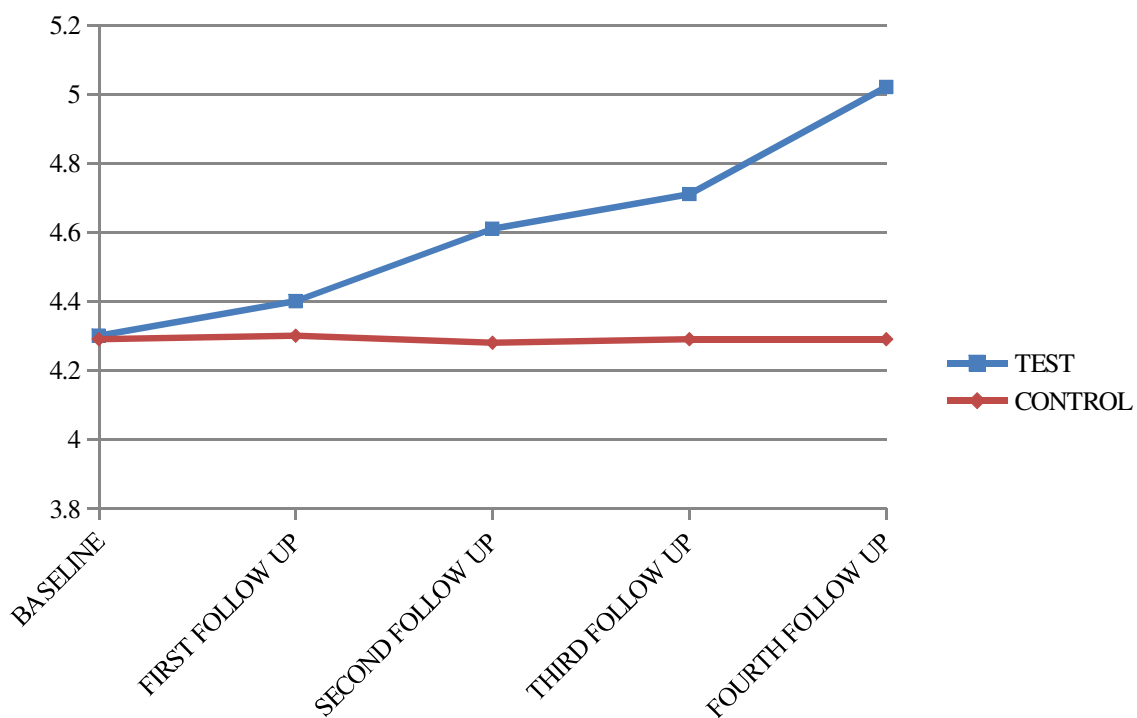
	<b>Group</b>	<b>4 or more nights a week(%)</b>	<b>2 or 3 nights a week (%)</b>	<b>Once a week (%)</b>	<b>Once or twice (%)</b>	<b>Not at all (%)</b>
<b>Baseline</b>	Test	11.32	22.64	28.30	24.52	13.20
	Control	17.30	13.46	38.46	13.46	17.30
<b>Final fol- low up</b>	Test	1.88	7.54	30.18	18.86	41.50
	Control	21.15	26.92	32.69	11.53	7.69

**NIGHT TIME AWAKENING AS PER ACT SCORE**

## ASSESSMENT OF MINI AQOL

At baseline and in 1st and 2nd follow up, no significant ( $p>0.05$ ) difference was observed in mini AQOL scores of test and control groups. But from 2 follow up to final follow up, the scores of test group was significantly improved compared to the control group. The scores are given in table.

	Test(Mean $\pm$ Sd)	Control(Mean	P Value
<b>Baseline</b>	4.30 $\pm$ 0.78	4.29 $\pm$ 0.79	0.955
<b>First Follow Up</b>	4.40 $\pm$ 0.84	4.30 $\pm$ 0.77	0.499
<b>Second Follow Up</b>	4.61 $\pm$ 0.68	4.28 $\pm$ 0.79	0.028
<b>Third Follow Up</b>	4.71 $\pm$ 0.63	4.29 $\pm$ 0.76	0.006
<b>Fourth Follow Up</b>	5.02 $\pm$ 0.68	4.29 $\pm$ 0.79	0.000

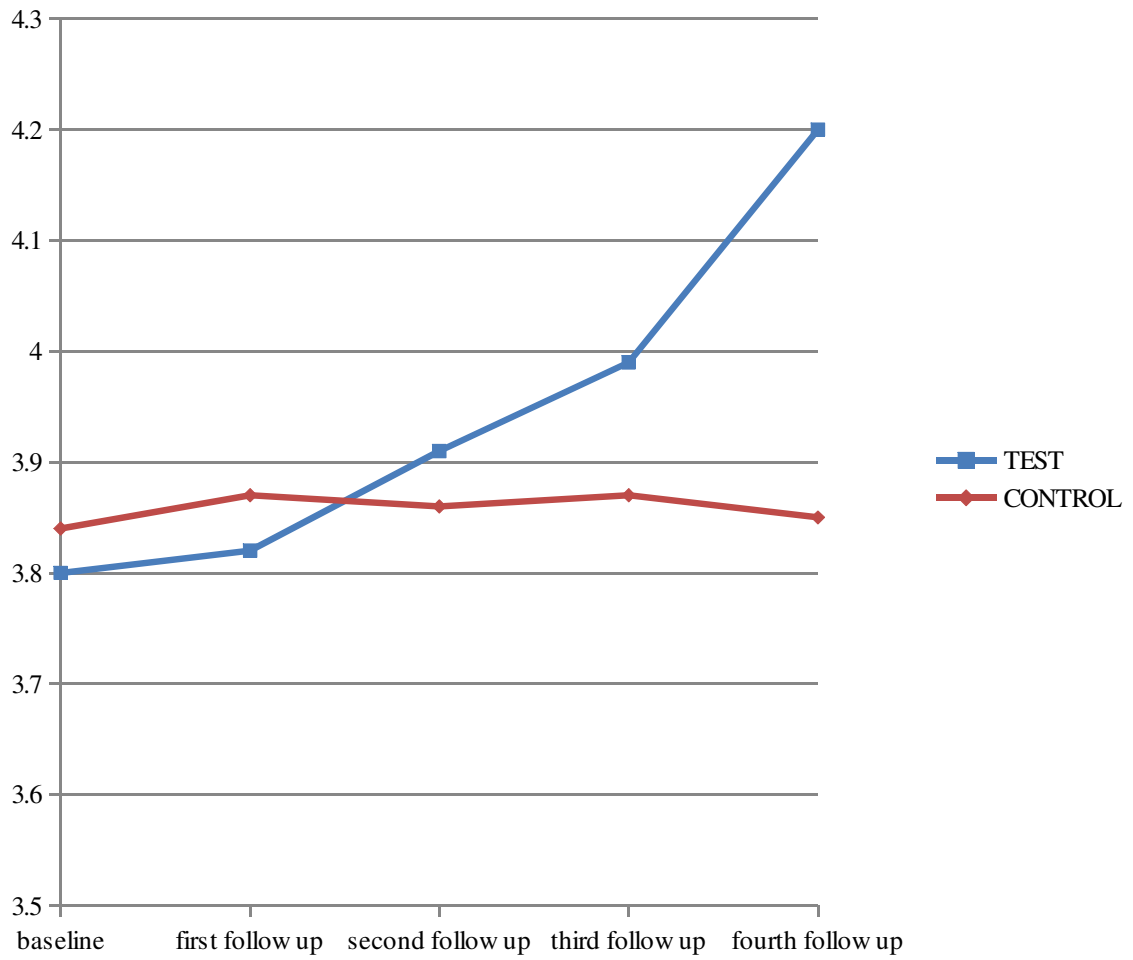


## ASSESSMENT OF INDIVIDUAL DOMAINS OF AQOL SYMPTOM DOMAIN

	Test(Mean $\pm$ Sd)	Control(Mean $\pm$ Sd)	P Value
<b>Baseline</b>	3.80 $\pm$ 1.07	3.84 $\pm$ 1.13	0.844
<b>First Follow Up</b>	3.82 $\pm$ 1.09	3.87 $\pm$ 1.07	0.826
<b>Second Follow Up</b>	3.91 $\pm$ 1.13	3.86 $\pm$ 1.13	0.801
<b>Tird Follow Up</b>	3.99 $\pm$ 1.15	3.87 $\pm$ 1.00	0.572
<b>Fourth Follow Up</b>	4.20 $\pm$ 1.09	3.85 $\pm$ 1.12	0.101

The data did not show any significant difference in physical functioning. When viewing from baseline to final follow up there was gradual improvement in physical functioning of the test population compared to the control group.

**GRAPHICAL REPRESENTATION OF ASSESSMENT OF  
INDIVIDUAL DOMAINS OF AQOL SYMPTOM DOMAIN**



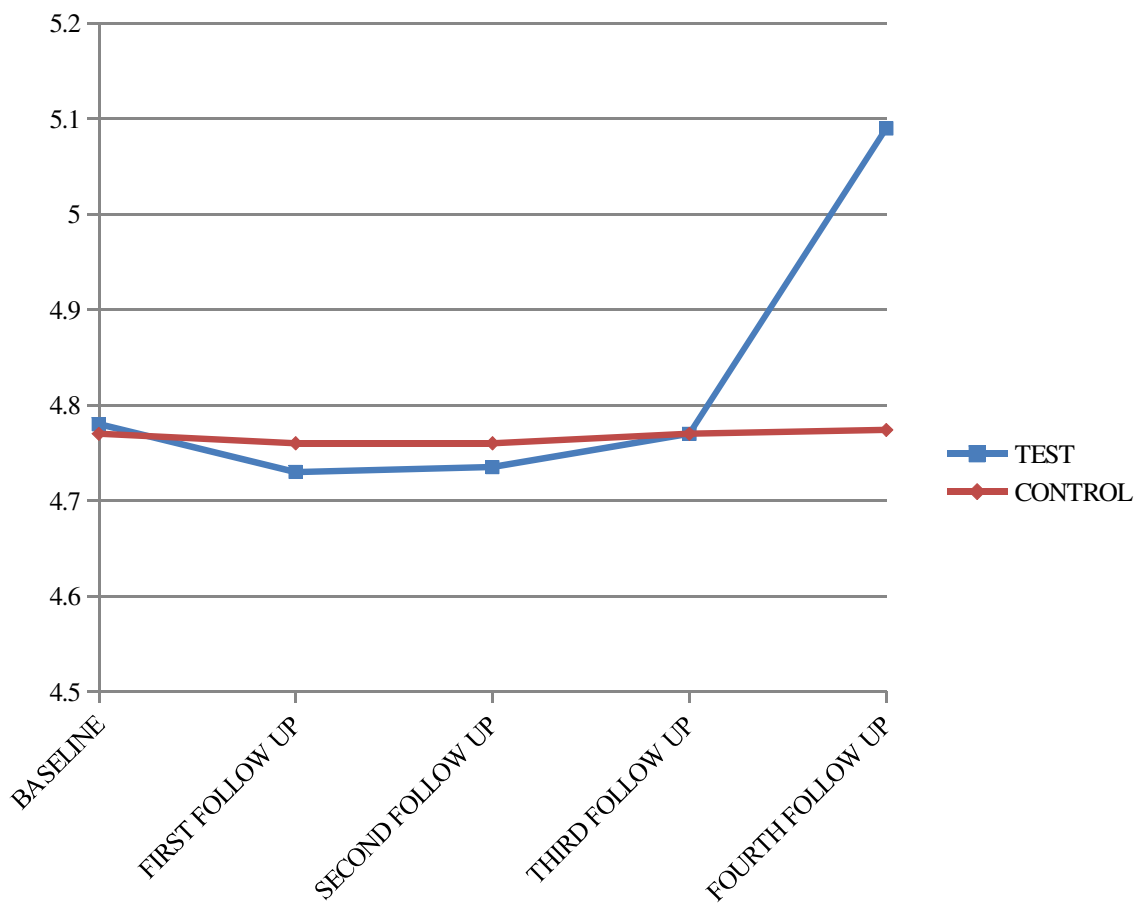


**ACTIVITY**

No significant difference was found in activity from baseline upto 3rd follow up. but data in the final follow up showed significant difference.

	<b>Test(Mean ± Sd)</b>	<b>Control(Mean ±Sd)</b>	<b>P Value</b>
<b>Baseline</b>	4.78±0.71	4.77 ±0.75	0.976
<b>First Follow Up</b>	4.73 ±0.74	4.76± 0.65	0.781
<b>Second Follow Up</b>	4.735± 0.73	4.76 ±0.70	0.814
<b>Third Follow Up</b>	4.77±0.71	4.77 ±0.63	0.982
<b>Fourth Follow Up</b>	5.09±0.82	4.774±0.70	0.032

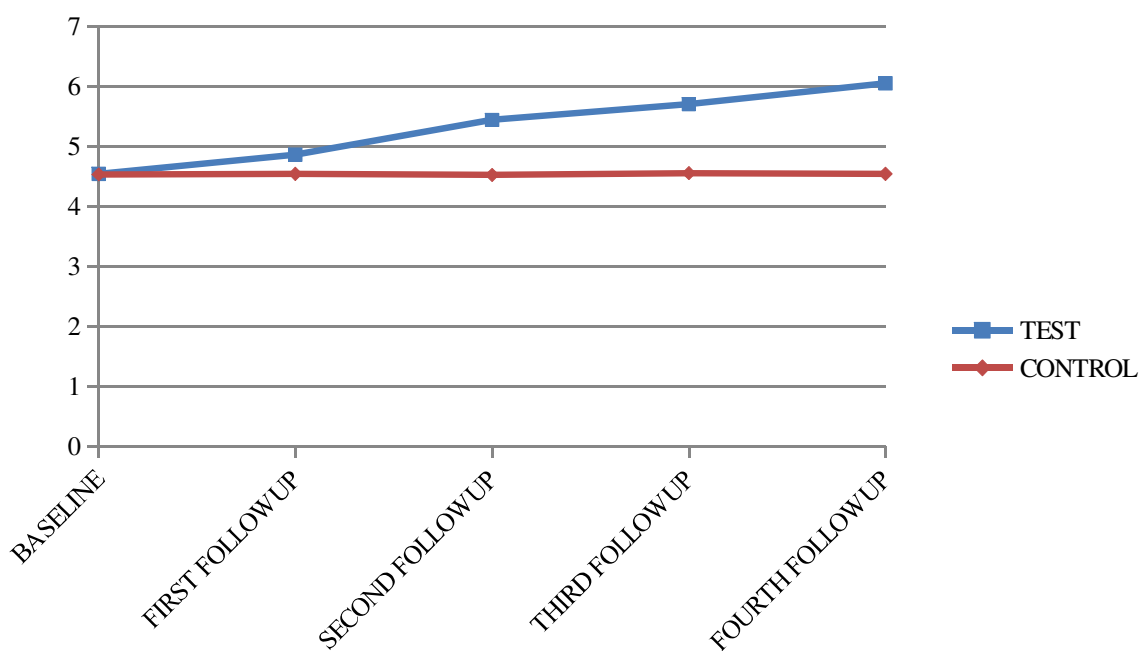
### GRAPHICAL REPRESENTATION OF ACTIVITY



## EMOTION

At the baseline no significant difference was noted, but from 1<sup>st</sup> follow up to final follow up the scores of test group was significantly improved compared to the control group.

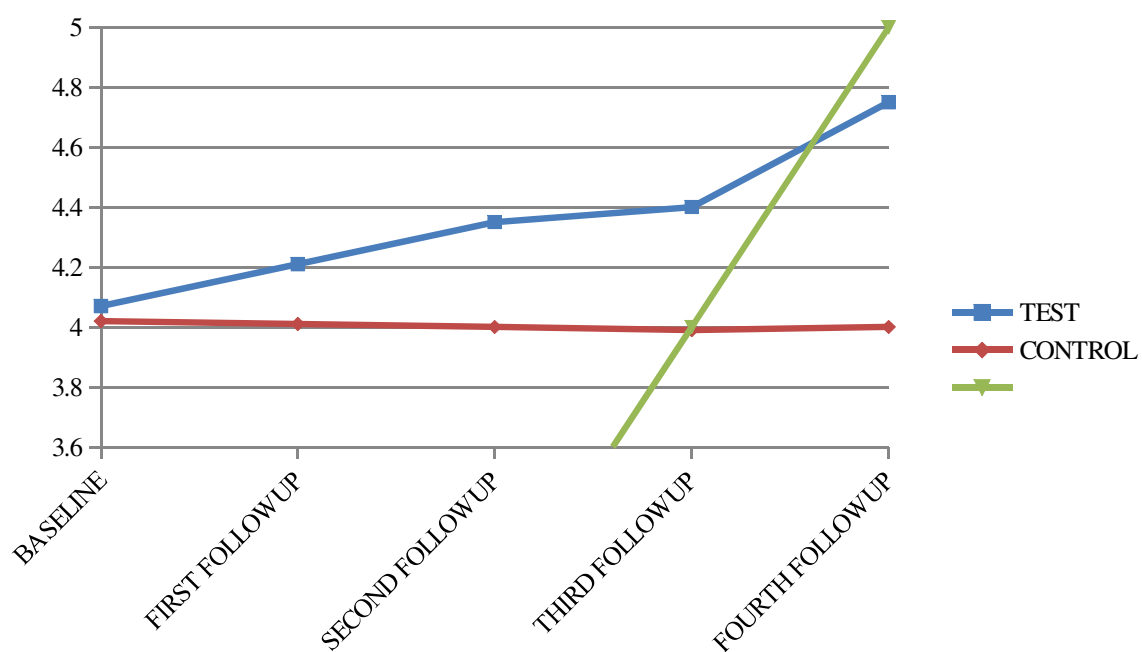
	Test(Mean $\pm$ Sd)	Control(Mean $\pm$ Sd)	P Value
<b>Baseline</b>	4.54 $\pm$ 1.10	4.53 $\pm$ 1.08	0.967
<b>First Follow Up</b>	4.86 $\pm$ 1.32	4.54 $\pm$ 1.08	0.180
<b>Second Follow Up</b>	5.44 $\pm$ 0.593	4.52 $\pm$ 1.075	0.000
<b>Third Follow Up</b>	5.70 $\pm$ 0.42	4.55 $\pm$ 1.11	0.000
<b>Fourth Follow Up</b>	6.05 $\pm$ 0.39	4.538 $\pm$ 1.07	0.000



## ENVIRONMENT

At the baseline no significant difference was noted, but from 1<sup>st</sup> follow up to final follow up the scores of test group was significantly improved compared to the control group.

	Test(Mean $\pm$ Sd)	Control(Mean $\pm$ Sd)	P Value
<b>Baseline</b>	4.07 $\pm$ 0.73	4.02 $\pm$ 0.75	0.730
<b>First Follow Up</b>	4.21 $\pm$ 0.69	4.01 $\pm$ 0.76	0.172
<b>Second Follow Up</b>	4.35 $\pm$ 0.52	4.00 $\pm$ 0.75	0.006
<b>Third Follow Up</b>	4.40 $\pm$ 0.49	3.99 $\pm$ 0.73	0.001
<b>Fourth Follow Up</b>	4.75 $\pm$ 0.60	4.00 $\pm$ 0.74	0.000



## SPIROMETRY

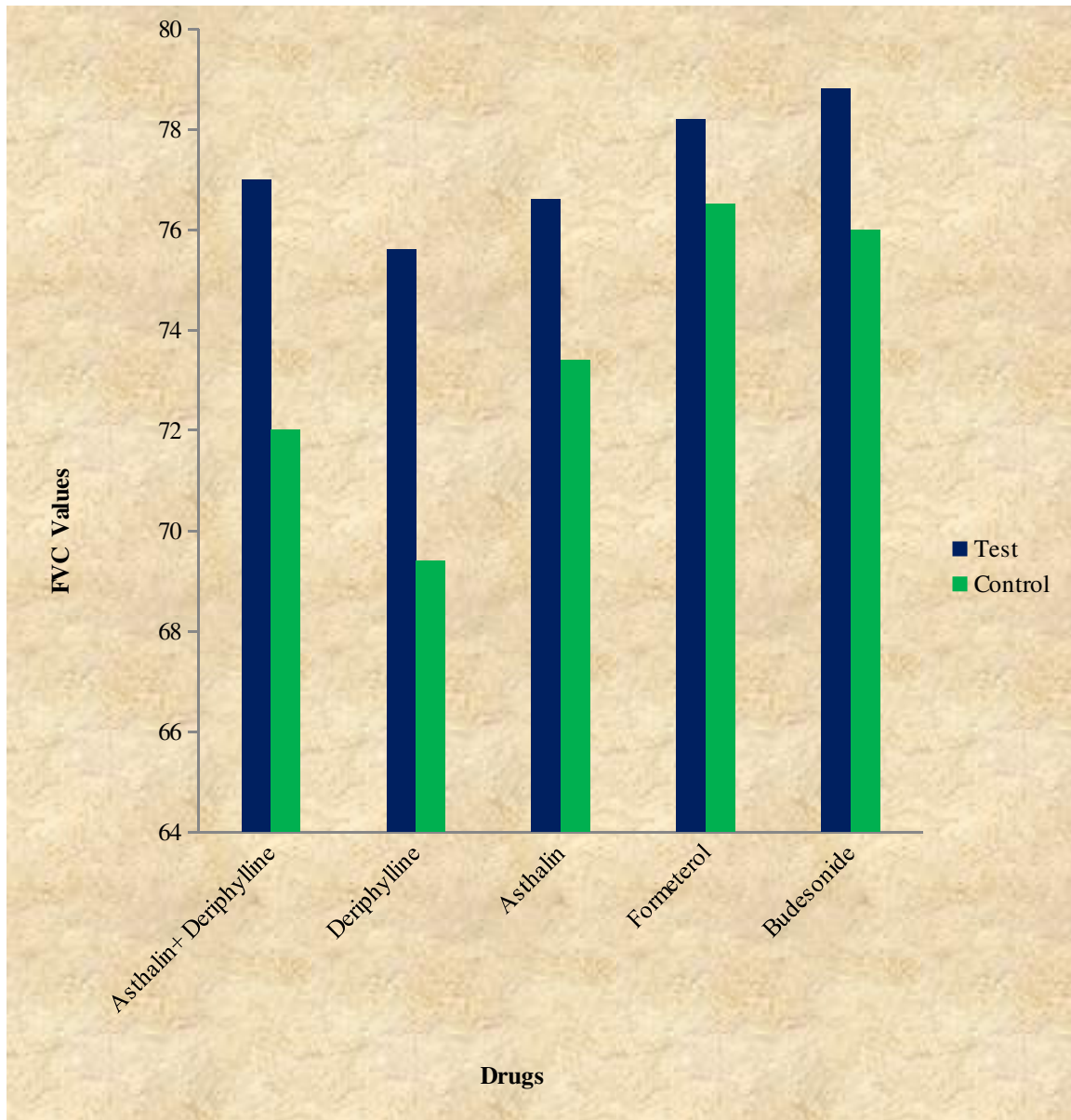
In the final follow up, the FVC and FEV<sub>1</sub> scores of test group was significantly improved when compared to the control group.

Spirometric values	Test (Mean)	Control (Mean)
FVC	80.92	77.2
FEV <sub>1</sub>	77.61	74.24

## IMPACT OF DRUG

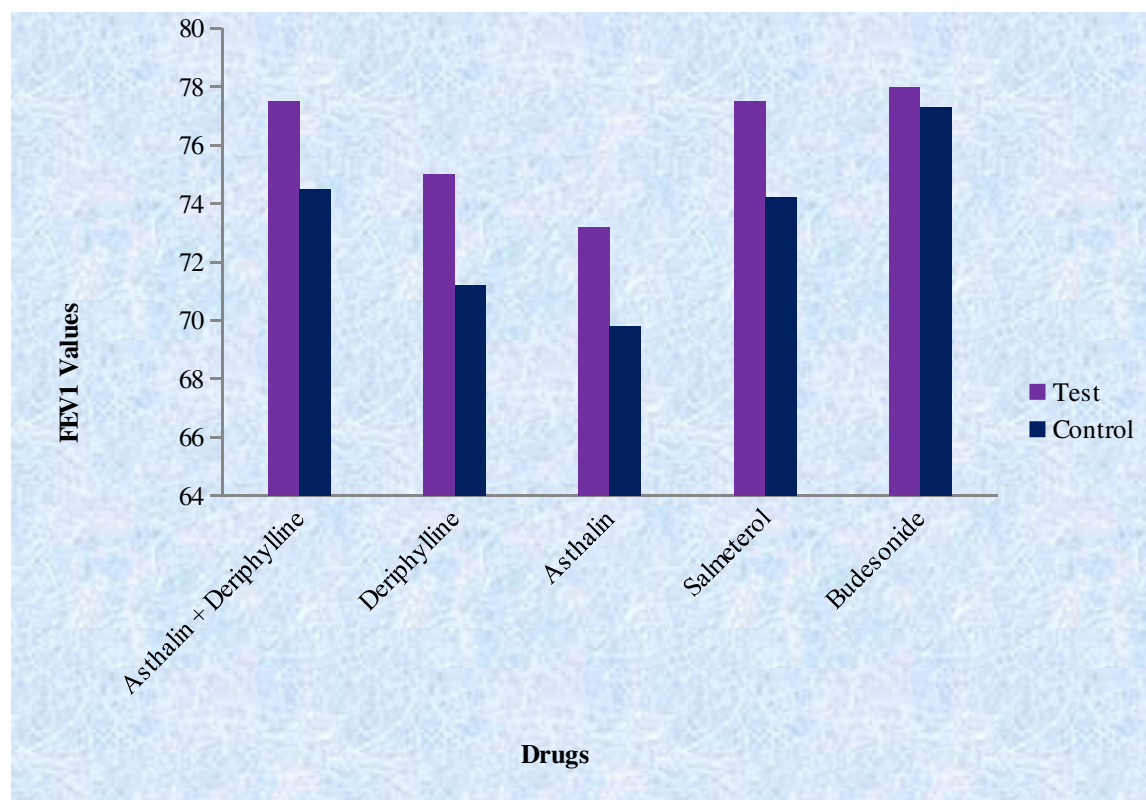
Based on the drugs taken the patients are classified, and those comes under test shows a slight improvement in the lung capacity when compared to the control group.

FVC		
Drugs	Test	Control
Asthalin + Deriphylline	77	72
Deriphylline	75.6	69.4
Asthalin	76.6	73.4
Formeterol	78.2	76.5
Budesonide	78.8	76

**IMPACT OF DRUG BASED ON FVC**

## IMPACT OF DRUG BASED ON FEV<sub>1</sub>

FEV <sub>1</sub>		
Drugs	Test	Control
Asthalin + Deriphylline	77.5	74.5
Deriphylline	75	71.2
Asthalin	73.2	69.8
Formeterol	77.5	74.2
Budesonide	78	77.3



## DISCUSSION

Asthma is a chronic inflammatory disease of the airways. In spite of the advances made in the management of asthma the morbidity and mortality rates are still in rise world-wide. Besides the physician's efforts in controlling the disease, patient's cooperation is also very important for successful management of asthma. The success of any medical regimen prescribed for a particular patient often depends, in large part, on three factors: firstly the patient's attitude towards the illness, including his or her willingness to work with the physician to manage the disorder: secondly self confidence of the patient: and the patient's knowledge regarding the illness, which enables him her to take appropriate action to control particular symptoms. These three factors interact to contribute to patient's compliance with treatment regimens and the extent to which they will get involved and participate in their own treatment. This is particularly true for any chronic disease.

Lack of knowledge in a patient with asthma, will results in treatment failure because the patient will be unaware of the appropriate steps to be taken in managing his/her disease or the need to avoid triggers. Similarly, if a patient possesses adequate knowledge but lacks the confidence or to manage an exacerbation the treatment will be unsuccessful. Similarly if the patient has an uncooperative attitude them treatment may not succeed despite appropriate medication. Education is an important factor for the success of any self- management program in asthma.

Therefore patient's awareness to their disease and its management are essential to achieve good asthma control and quality of life. Various research studies have shown that pharmacist mediated counselling has a positive influence on adherence behavior and decreased morbidity and mortality.

The present study also has shown that the pharmacist mediated patient education has an influence on patient's knowledge, attitude and practice towards the disease management, Asthma Control Test and Asthma Quality Of Life improved in the test group patients compared to the control group patients.

In this study, a total of 105 patients (53 in Test and 52 in Control) have completed the study. The sample consisted, females 41.5% in test group and 42.3% in control group and males 58.5% in test group and 57.7% in control group. This showed that males were



predominant. When participants were categorized into age groups, four subjects in test group belong to the age group of 18 to 20 years, thirty four subjects belong to the age group of 21 to 55 years and fifteen subjects belong to the age of 55 to 60 years. This showed that mostly asthmatics were between the ages of 21 to 55 years. When viewing the educational status majority of patients in both test (66%) and control (61.5%) group belong to high school or pre degree level. Demographic details, like age, gender, education, smoking history, duration of asthma, education status and treatment regimen were similar in control and test groups showing that the randomization done was appropriate.

### **Analysis of asthma education profile questionnaire**

Asthma is a progressive disorder, which requires continuous management to control the symptoms. Increased knowledge about the disease and the management may improve the asthma control in patients. In asthma education profile questionnaire only the test group was given education but control group did not receive education till the final follow-up.

The results of asthma education profile questionnaire suggest that patients at the baseline possess poor knowledge on disease and its management. This may be due to inadequate information about the disease and medication usage techniques, patient's poor interest to know the disease management. Studies were conducted about the disease awareness, triggering factors, adherence behavior and inhaler usage technique among the selected group of patients who received treatment from various practitioners. The results indicate that increased awareness about the disease and management depends upon the education provided by the health care professional to the patient.

In the present study, the poor awareness of the patients towards the disease and its management can be attributed to inadequate information provided by the health care professional. At the final follow up, the percentage improvement of knowledge was increased in test group patients compared to the control group patients. In Asthma education profile questionnaire more than 50% improvement was shown by test group on questions regarding symptoms, triggering factors, methods to avoid them and also proper use of inhalers. This may be because of pharmacist mediated patient education to the test group patients. The result suggests that, education provided by health care professional has a positive influence on patient's disease management attitude.

### **Assessment of inhaler usage technique**

The results of the present study reveals that patients of both control group and test group could not perform all the steps of inhalers appropriately as indicated in standard checklists. In our study we have observed that patients who are on inhalers, were finding difficulty in performing certain steps such as tilt the head back, exhale as much as possible, coordination between actuation and inhalation, continue inspiration slow and deep, holding the breath for 10 seconds were not performed by many patients at the baseline in both control and test groups. These are all the most crucial steps in increasing the efficacy of drug in asthma patients. As the education was provided to the patients of test group regarding the inhaler usage techniques at the baseline and regularly at each follow-up, the inhalation usage technique was improved in test group patients. The same was reflected in the results.

### **Measurement of Primary Outcome**

In this study Asthma Control Test was considered as the primary outcome. Awareness of the disease and its management shows a positive influence on the primary outcome. In the present study a significant improvement in ACT scores were observed. This may be mainly because of structured patient education, which suggests that education has a positive influence on asthma control. This patient education has resulted in proper usage of inhalers and reduction in night time awakening in test group compared to control group. At the baseline in the test group, there was 11.32% of people were awakened four or more times in a week and 22.64% of patients awakened two or three times in a week. After the final follow up the number decreased to 1.88% and 7.54% respectively.

### **Findings on mini AQOL**

This study has shown that pharmacist mediated structured patient education found to have significant influence on improvement in the quality of life. Patients in the test group had shown a significant improvement in their quality of life compared to the control group patients.

But when analyzing individual domains in mini AQOL emotional and environmental domain showed significant difference from 1st follow up to final follow up. The assessment of emotion was calculated on feedback from aspects such as

frustration as well as concern about asthma and medication. Environmental domain, evaluated on feedback about bothering regarding dust, cigarette smoke and pollution. Both of these domains could be improved by sufficient education and by spending more time with each patient so that they could speak up about their worries and difficulties regarding the disease.

Activity domain showed significant improvement only at the final follow up. This is due to the fact that most of them were reluctant to do mild exercises daily. By step by step education in each follow up and providing changes in life style modification an impact was produced at the final follow up.

Symptom domain does not show significant improvement. But a slight improvement was observed in symptom relief in the test group compared to control group. The pharmacist provided patient education, helped in improvement in all domains except symptom domain.

Non-adherence to treatment is generally perceived as the preferred reason because of the cost involved in purchasing maintenance medication such as inhaled corticosteroids, or long-acting bronchodilators such as salmeterol which are not supplied in the government system. However, this may have a very negative influence on asthma quality of life. This also demonstrates why education and health promotion should be directed at areas that will improve wellness behavior by patients.

Also widespread use of inhaled medication in the developed countries has led to a reduction in the number of asthma deaths and days off work and off school; improved quality of life; and has resulted in a paradigm shift in the way an asthmatic considers his illness. Despite the increasing knowledge and understanding of asthma and its management, optimum treatment is apparently not reaching the vast majority of people in countries like India. A study published in the reputed British journal Thorax notes that doctors working in poorer countries are unable to use optimum treatment because of the high cost and lack of access to medication although they may be fully aware of the advantages of such treatment.

Secondly, short-term relievers like theophylline and salbutamol are more popular than inhaled steroids, which, though working more slowly, address the real problem of in-famed airways in asthma far more effectively. Therefore periodic injections and short

courses of tablets are more commonly used, which give the asthmatic the illusion that his disease is not chronic but only an occasional 'allergy' in an otherwise normal lung. This strategy, unfortunately, can give rise to sudden, severe and occasionally life-threatening attacks of asthma and can also lead to progressive deterioration of lung function over the years.

Regular use of inhaled steroids over prolonged periods is considered to be expensive. In this study out of the 105 patients only 28.51% are using inhaled medications. Also inhaled medication is not available from government hospitals and health centers. Even though few are using inhalers, they are not able to afford the price. So regular use is impossible for them.

All the above reasons had a negative impact on symptom domain in this study.

### **Smoking**

At the start of the study, nine (17.3%) patients in the control group and eleven (20.8%) patients in the intervention group reported to be current smokers. Of the smoking patients in the control group, two had quit smoking, seven were still smoking after final follow up. Of the smoker in the intervention group, six had quit smoking, five were still smoking but the frequency was less than earlier after final follow up.

## SUGGESTIONS

1. Individualized asthma management programs should be promoted in each primary, secondary and tertiary care hospitals.
2. Inhaled medication should be made available through government hospitals at low cost
3. More cooperation is imperative between health-care officials and primary and secondary care providers in order to develop individualized asthma management programs that will work at primary care centers.
4. Programs may be conducted to train both hospital and community pharmacists to control their patients with asthma and other chronic diseases.
5. Awareness of asthma as a common and debilitating condition needs to be improved by government institutions.
6. Pharmaceutical companies should come forward to supply basic inhalers, particularly the earlier introduced but effective ones at a lower cost.
7. The safety, efficacy, necessity and techniques of inhaled steroids should be widely disseminated among the general public.
8. Simple spirometers and peak flow meters should be made available in all government hospitals.

## LIMITATIONS

- Long term impact of patient education could not be assessed as this study was carried out for a shorter duration.
- Existing study focused only in improving triggering factors and its prevention, life style modifications and inhaler technique of patients who attend the clinic. Other factors of the disease were not included in the present study.

## MERITS

Asthma Control Test was used as a primary outcome, which incorporates the "patient reported outcomes" .This, will serve to shift the focus of control of asthma from

physician's assessment to patient's own assessment of the disease.

## CONCLUSION

This study showed that improved patient knowledge on its own improve morbidity and mortality. Enabling patients to identify problems by providing the necessary skills, with the assistance of the health care team may revolutionize the world of asthma.

This study confirmed that knowledge of asthma improved asthma control and asthma quality of life. A good correlation was found between knowledge and asthma quality of life.

The level of asthma knowledge, degree of asthma control, and asthma quality of life had to be assessed in this particular population because the baseline knowledge was needed to further intensify and build a holistically appropriate health education programs. The important gaps in knowledge identified by the study, explains why people are under-treated and have poor asthma control.

In the population studied no association was found between educational status and asthma quality of life. Asthma interventions should, therefore, target attitudes, perceptions, and practical skills that influence day to day practices along with factual knowledge to be successful in reducing morbidity. By improving problem-solving capabilities through self-management strategies, functional status may improve and enhance asthma quality of life. Good quality of life leads to positive expectations regarding the outcome of the disease and will, therefore, reduce fear and anxiety. All of these aspects will improve asthma morbidity and give patients the confidence to self-regulate their disease

The research carried out in this work utilized the skills and therapeutic expertise of the pharmacist in the current environment, to develop an asthma outreach health promotion in a rural setting .Pharmacist provided asthma education has been shown to be effective as individualized education was better received by patients. Further, it also showed that individualized asthma education is more effective for certain outcomes such as inhaler technique and physical activity

This study also addresses the issue of asthma management in the Indian rural setting. In rural area, asthma management practices have been shown to be poorer and asthma mortality rates considerably higher than those of metropolitan areas. There are a limited number of accesses to health care services and shortages in specialist services are increasing the asthma. The chronic shortage of medical practitioner's results in extremely long waiting times, and often patients fail to approach health care practitioners due to difficulty of access. Therefore, it becomes paramount that people with asthma in rural areas become involved in self-management of their asthma and that the community-based health care providers be more proactive in facilitating these self-management behaviors.

In India, the involvement of community pharmacists in asthma health promotion or outreach programs has been limited, despite the beneficial effects associated with these pro-grams in improving asthma outcomes. The work completed in this thesis shows that pharmacists can effectively deliver asthma outreach programs in rural settings which result in an increase in asthma awareness and an improvement in asthma knowledge, which can result in an improvement in patient asthma outcomes.

It can therefore be concluded that in our country, interactions with pharmacists hold great potential.

An important element to this study was that it demonstrated the need for collaboration between the health care professionals in order to be able to achieve successful asthma outreach health promotion.

Future works should involve, engaging more pharmacists to deliver these roles on a larger scale across India. Also strengthening aspects other than knowledge to enhance asthma control might be beneficial for proper asthma management. For health care providers, the aim should be to empower people suffering from asthma to be responsible and confident enough to control their own disease. Apart from therapy patients should be involved in self-management plan. Self-management will also increase patients' knowledge and awareness about asthma and its treatment because people will learn what to do when they are well and when they are symptomatic .The credibility of such programs will also increase if health professionals give attention to patient's beliefs or their goals to satisfy their specific needs.



In India, asthma is on rise and still remains a mystery, to unravel this it needs a lot of study, involvement of health care professionals and patients and of course asthma control should be a habit.

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