A Survey on Knowledge and Management of Childhood Asthma

Submitted By

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A dissertation submitted to the Department of Pharmacy, East West University, in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy.

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DEDICATION

This Research Paper is Dedicated To my Beloved Parents, Who are my Biggest Inspiration…

DECLARATION BY THE CANDIDATE

I, Akayed Binte Aman, hereby declare that this dissertation, entitled **'A survey on Knowledge and Management of Childhood Asthma'** submitted to the Department of Pharmacy, East West University, in the partial fulfillment of the requirement for the degree of Bachelor of Pharmacy (Honors) is a genuine & authentic research work carried out by me. The contents of this dissertation, in full or in parts, have not been submitted to any other institute or University for the award of any degree or Diploma of Fellowship

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CERTIFICATION BY THE SUPERVISOR

This is to certify that the dissertation, entitled **'A survey on Knowledge and Management of Childhood Asthma'** is a bona fide research work done by Akayed Binte Aman (ID: 2011-1-70-067), under my guidance in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

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ENDORSEMENT BY THE CHAIRPERSON

This is to certify that the dissertation, entitled **'A survey on Knowledge and Management of Childhood Asthma'** is a bona fide research work done by Akayed Binte Aman (ID: 2011-1-70-067), under the guidance of Nishat Nasrin, Senior Lecturer and Supervisor, in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

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Last but not the least, I would like to thanks my family and friends for their care and encouragement during my research work.

Content

List or Figures:

List if abbreviation:

GINA Global Initiative for Asthma

FEV1 Forced Expiratory Volume

MDI Metered Dose Inhaler

DPI Dry Powder Inhaler

ICS Inhaled Corticosteroid

LABA Long Acting β_2Agonist

LTRA Leukotriene Modifier Antagonist

SABA Short Acting β_2 Agonist

NCDs Non-Communicable Diseases

COPD Chronic Obstructive Pulmonary Disease

ABSTRACT

Asthma is a chronic disease with both inflammatory and blocked or narrowed airways. It is a common disease in children. We conducted a study to assess the management and knowledge of asthma symptoms, attack and medication, compliance to treatment, emergency department visits and causes of asthma. Data were collected from 210 pediatric patients who had asthma. This study was done in different hospitals of Dhaka city. A questionnaire was given them to test their baseline knowledge and beliefs on asthma, medications and their compliance to treatment. The result showed that among 210 children, most of the children (38%) had asthma in the age range of 6-10 years. Most of the patients (42.85%) had mild intermittent asthma. Moreover, most asthma symptoms occurred in winter season (53.80%) and summer season (32.87%). About 51% patients had difficulty to sleep due to asthma. Approximately 37.14% patients took professional routine check-ups, and 36.19% patients took emergency treatment by doctor in the last 12 month. About 61.43% respondents had knowledge about sign identification given by professional. According to the respondents, the symptoms responsible for causing asthma were allergy (77.62%), air pollution (65.72%), common cold (88.09%) and certain food (72.85%). Only 21.43% patients had exhaust fan in their home and used regularly when cooking, about 45.71% patients had wood burning stove used in home. About 52.86% patients used a prescription inhaler, 71.9% long-acting β_2 agonist, 55.7% leukotriene modifier, 36.6% corticosteroids, 31.43% mast cell stabilizer, 41.9% expectorant, 75% antitussives, 33% mucolytics were prescribed. Asthma education strategies need to be modified to engage patients with low asthma knowledge to achieve improved patient outcomes. Further, strategies need to motivate patients to use preventer medication during times when they feel well.

A. Introduction

1.1 Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation.
It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation (GINA, 2005).
Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, in particular, mast cells, eosinophils, T lymphocytes, macrophages, neutrophils, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment (Harman *et al.*, 2006)

1.2 Childhood Asthma

Children with recurrent cough, wheezing, chest tightness or shortness of breath may have one or more forms of asthma. Children have smaller airways than adults, which makes asthma especially serious for them. Both symptoms and airflow limitations characteristically vary over time and intensity. These variations are triggered by factors such as exercise, allergen or irritant exposure, but may minimize with treatment (Boulet *et al.*, 2015).

1.2.1 Pathophysiology:

1.2.1.1Pathophysiological asthma is an inflammatory disorder of the lungs. The pathogenesis of asthma is highly complex and as of today incompletely understood. Based on clinical and laboratory findings different phenotypes have been suggested (Figure1.3).The majority of asthma occurs on an IgE-mediated background with sensitisations to inhaled allergens called allergic asthma. Asthma which occurs on a non-allergic background is termed intrinsic asthma. Asthma often results in chronic persistent airway inflammation unrelated to allergen contact and has features of auto immunity. Long term chronic inflammation has been associated with airway remodelling with an increasingly fixed airflow limitation as a result of "scarring" of the airways (Lalloo *et al.*, 2013).

Evolving concepts of asthma pathogenesis (Figure1.1& 1.2)

1. A primary abnormality of airway-myocyte hyper responsiveness
2. Autonomic dysfunction with exaggerated activity of cholinergic or tachykinin pathways
3. IgE-mediated mast cell/basophiles degranulation
4. Complex T lymphocyte–mediated airway inflammation
5. Airway remodelling (Agache *et al*., 2012).

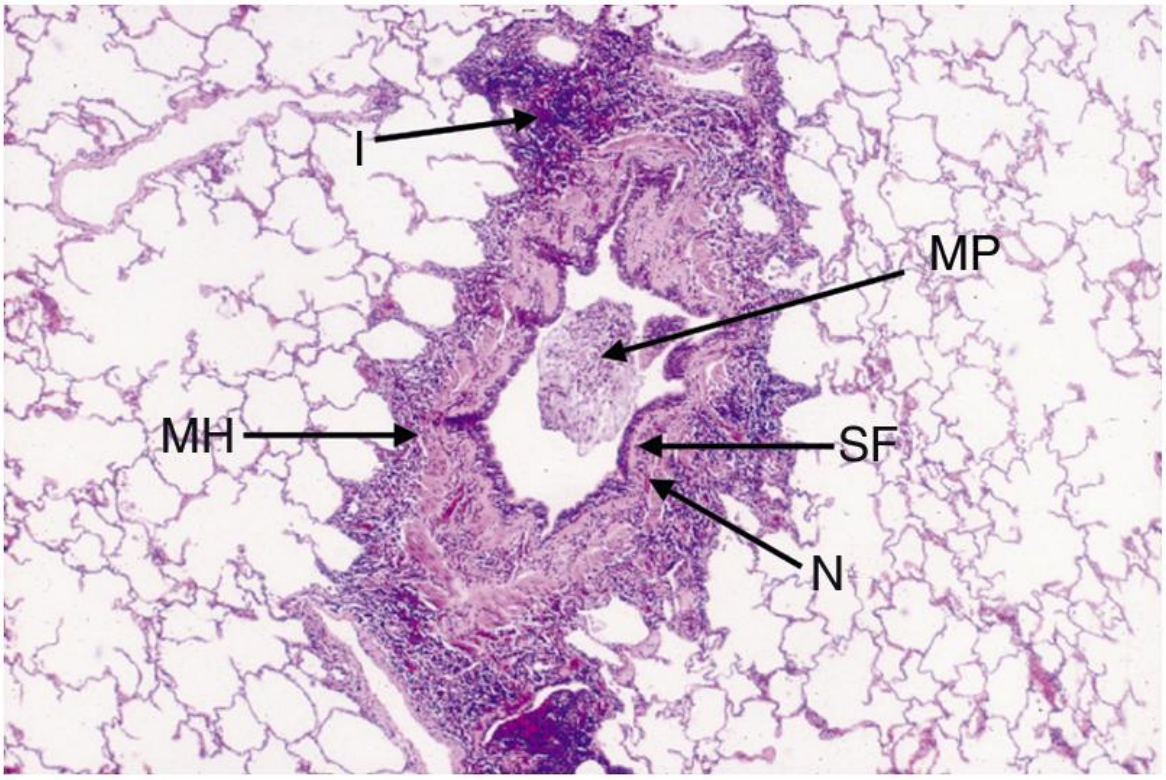

Figure 1.1: Inflammation and remodelling in the asthmatic airway. There is impressive inflammation (I), mucus plugging (MP), sub epithelial fibrosis (SF), myocyte hypertrophy and hyperplasia (MH), and neovascularisation (N)in this autopsy lung section from a teenage asthmatic individual (Agache *et al*., 2012).

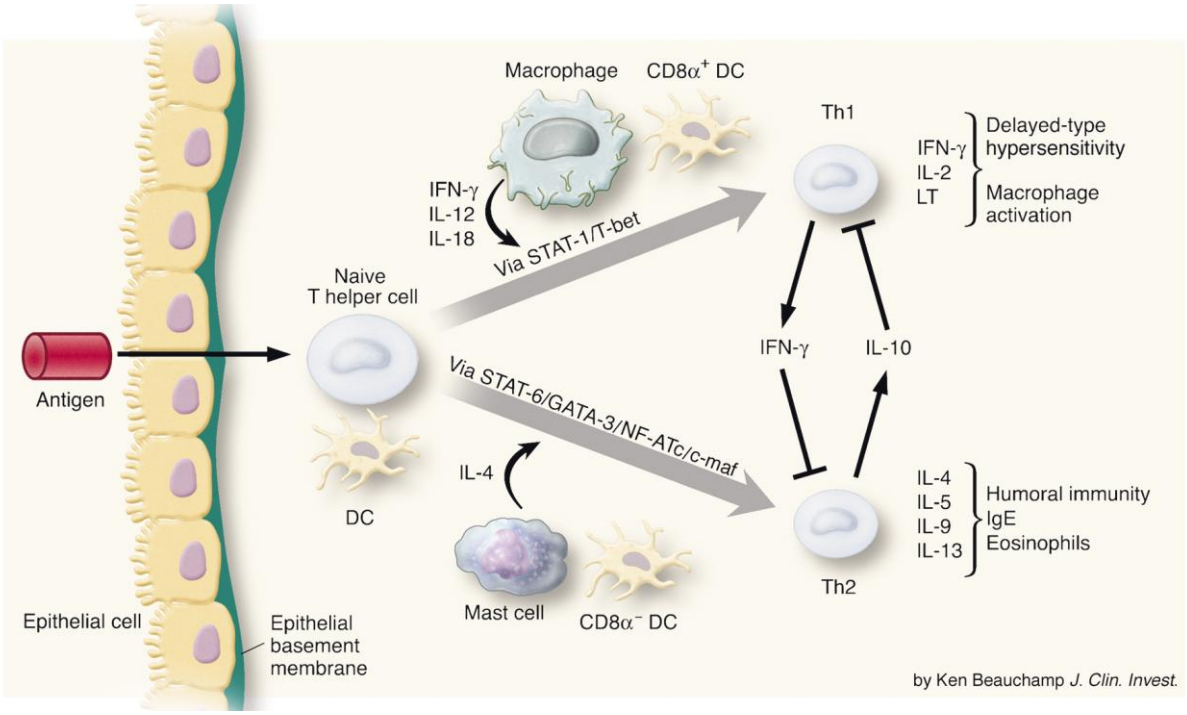

Figure 1.2: Development of Th1 and Th2 lymphocytes. Antigens enter through the endo-bronchial tree, cross the epithelial surface, and interact with naive TH cells and DCs. As a result of signals from the surrounding microenvironment, they differentiate into Th1 cells, which produce IFN-γ, IL-2, and lympho-toxin (LT), or Th2 cells, which produce IL-4, IL-5, IL-9, IL-13, and IL-10. Polarization into Th1 cells occurs via a STAT-1– and T-bet–dependent pathway under the influence of CD8α+ DCs and macrophage-derived cytokines such as IFN-γ, IL-12, and IL-18. Differentiation into Th2 cells occurs via a pathway that involves STAT-6, GATA-3, nuclear factor of activated T cells-c (NFATc), and c-maf under the influence of CD8α– DCs and IL-4, which may come from mast cells (Agache *et al.*, 2012).

1.2.1.2 Clinically signs and symptoms of asthma vary from patient to patient. Episodic shortness of breath, wheezing and the sensation that inspiration is no longer possible due to hyperinflation of the lungs are common. The pathophysiological equivalent in pulmonary function tests is a reduced FEV1 (Forced Expiratory Volume of the first second and PEF (Peak Expiratory Flow).A circadian peak of symptoms in the early morning hours is typical. Bronchial hyper responsiveness to non-specific airway irritants such as smoke, cold air, odours etc. Its characteristic can be tested with Broncho provocation test with histamine or methacholine. Allergic asthma is associated with increased levels of circulating total and specific IgE. Elevated numbers of eosinophil's can be found in the blood, the airway mucosa

and the Broncho alveolar lavage fluid. Asthmatic symptoms and/or asthma attacks increase following inhalation of allergens, but can also persist in the absence of allergenic triggers. The fraction of NO in exhaled breath (FeNO) can be elevated in asthma. Many patients experience worsening airflow obstruction and symptoms following exercise. Some suffer from severe attacks upon ingestion of non-steroidal anti-inflammatory drugs (Aspirin Exacerbated Respiratory Disease).None of these signs or symptoms, however, is characteristic. Asthma therefore remains a clinical diagnosis.

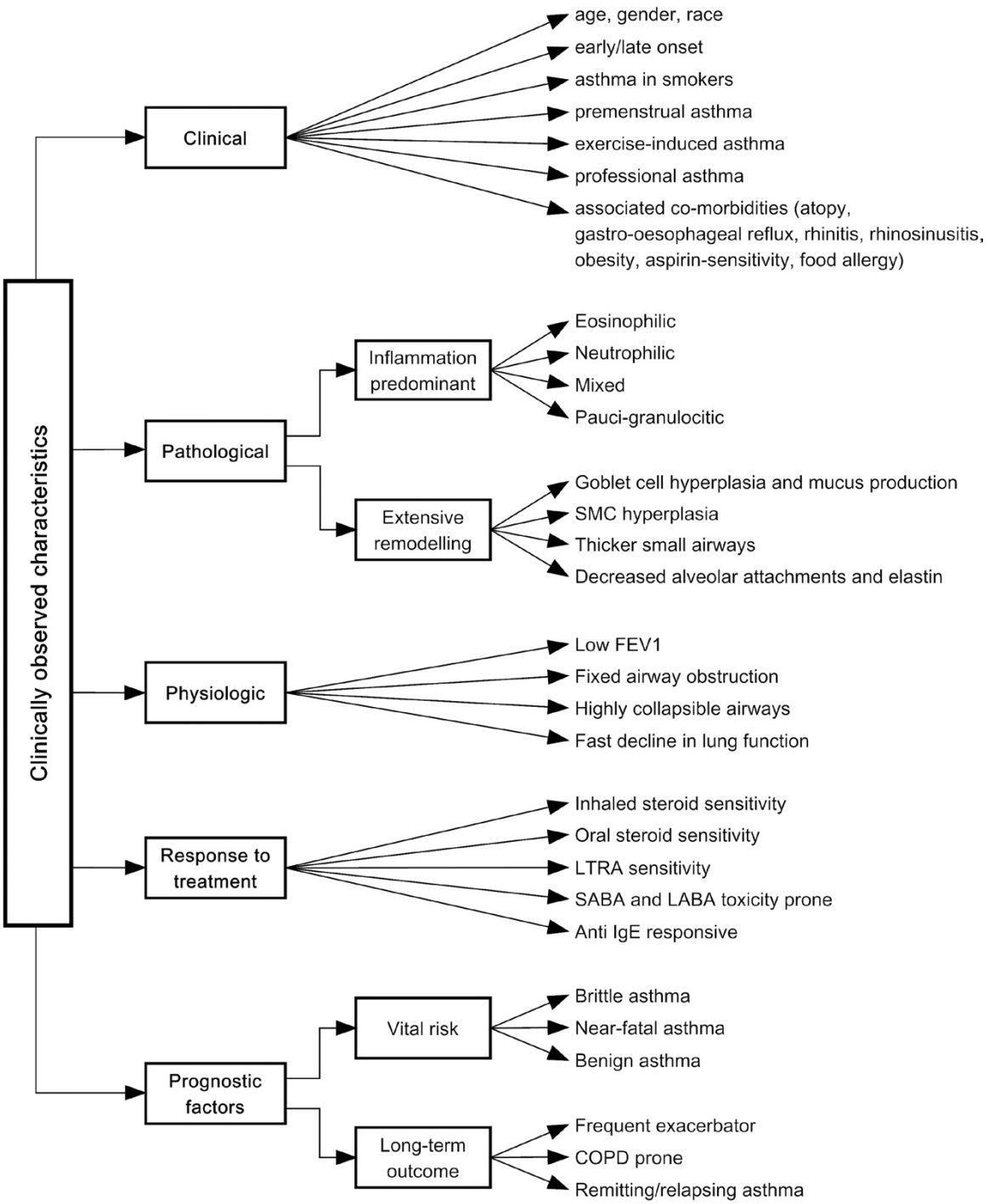

Figure 1.3 Clinically observed characteristics and asthma phenotypes (Agache *et al.*, 2012).

1.3 Causes of asthma

The exact cause of asthma is not known. An asthma attack is a reaction to a trigger. It is similar in many ways to an allergic reaction.

- An allergic reaction is a response by the body's immune system to an "invader."
- When the cells of the immune system sense an invader, they set off a series of reactions that help fight off the invader.
- It is this series of reactions that causes the production of mucus and bronchospasms. These responses cause the symptoms of an asthma attack.
- In asthma, the "invaders" are the triggers listed below. Triggers vary among individuals.
- Because asthma is a type of allergic reaction, it is sometimes called reactive airway disease.

Each person with asthma has his or her own unique set of triggers. Most triggers cause attacks in some people with asthma and not in others. Common triggers of asthma attacks are the following:

- Exposure to tobacco or wood smoke,
- Breathing polluted air,
- Inhaling other respiratory irritants such as perfumes or cleaning products,
- Exposure to airway irritants at the workplace,
- Breathing in allergy-causing substances (allergens) such as molds, dust, or animal dander,
- An upper respiratory infection, such as a cold, flu, sinusitis, or bronchitis,
- Exposure to cold, dry weather,
- Emotional excitement or stress,
- Reflux of stomach acid known as gastroesophageal reflux disease, or GERD
- Physical exertion or exercise (Asthma Australia, 2015).

1.4 Symptoms of asthma:

The presence of one or more of the following characteristic symptoms is suggestive of asthma:

• wheeze

• Chest tightness
• Shortness of breath
• cough.

Asthma is especially likely if any of the following applies:

• Symptoms are recurrent or seasonal
• Symptoms are worse at night or in the early morning
• Symptoms are obviously triggered by exercise, irritants, allergies or viral infections.

However, the symptoms of asthma vary widely from person to person. The absence of typical symptoms does not exclude the diagnosis of asthma. To detect possible asthma should be known about:

• Current symptoms
• Pattern of symptoms (e.g. course over day, week or year)
•Precipitating or aggravating factors (e.g. exercise, viral infections, ingested substances, allergens)
• Relieving factors
• Impact on work and lifestyle
• Home and work environment
• Past history of eczema, hay fever, previous events
• Family history of atrophy (Akdis *et al.,* 2013).

1.5 Diagnosis of asthma:

There is no 'gold standard' for the diagnosis of asthma. Recommendations regarding the tools and techniques for asthma diagnosis are based on consensus opinion among respiratory physicians. The diagnosis of asthma is based on:

- Patient history
- Physical examination
- Peak flow meter
- Spirometry (Hurd S. *et al.,* 2006)

1.5.1 Patient History:

Asthma can often be diagnosed on the basis of a patient's symptoms and medical history. Presence of any of these signs and symptoms should increase the suspicion of asthma:

i. Wheezing high-pitched whistling sounds when breathing out especially in children. (A normal chest examination does not exclude asthma.)

ii. History of any of the following:

- Cough,
- Worse particularly at night. (Copyright National Asthma Council Australia, 2006)

iii. Confirmation in presence of airflow limitation

- Document that FEV1/FVC is reduced (at least once, when FEV1 is low)
- FEV1/ FVC ratio is normally >0.75 – 0.80 in healthy adults, and >0.90 in children

iv. Confirmation of variation in lung function is greater than in healthy individuals

- The greater the variation, or the more times variation is seen, the greater probability that the diagnosis is asthma
- Excessive bronchodilator reversibility (adults: increase in FEV1 >12%and >200mL; children: increase >12% predicted)
- Excessive diurnal variability from 1-2 weeks' twice-daily PEF monitoring(daily amplitude x 100/daily mean, averaged)
- Significant increase in FEV1 or PEF after 4 weeks of controller treatment
- If initial testing is negative.
- Repeat when patient is symptomatic, or after withholding bronchodilators
- Refer for additional tests (especially children ≤5 years, or the elderly (GINA, 2005).

1.5.2 Physical examination

Physical examination includes the examination of the chest for infection and wheeze. Also look for signs of allergic rhinitis, which commonly co-occurs with asthma, because its presence will affect management. Also some important issues are,

- Wheeze is suggestive, but not diagnostic of asthma
- The absence of physical signs does not exclude a diagnosis of asthma.
- Crackles on chest auscultation indicate an alternate or concurrent diagnosis (Harman J. *et al.*, 2006).

1.5.3 Peak expiratory flow measurement

It is useful in the diagnosis of occupational asthma where very frequent testing is required, and is it useful way to monitor asthma control for some people. Single PEF measurements are not adequate for use in routine asthma management by doctors.

A peak flow meter is used to detect and measure a person's variation in best PEF, in order to assess variability of airflow limitation. Measurement of PEF:

- is effort-dependent
- Varies considerably between instruments.

Isolated readings taken in the surgery or pharmacy with a meter other than the person's own must be interpreted with caution because there is a wide normal range. Despite its limitations, monitoring of PEF at home or work is useful when:

- symptoms are intermittent
- symptoms are related to occupational triggers
- the diagnosis is uncertain
- when monitoring treatment response

- In the absence of an acute bronchodilator FEV1 response, monitoring of PEF over several days to weeks may be useful in making a diagnosis (Harman J. *et al*., 2006).

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1.5.4 Spirometry

Spirometry is the lung function test of choice for diagnosing asthma and for assessing asthma control in response to treatment.

- Single or office-based measurements of peak expiratory flow (PEF) with conventional peak flow meters have significant limitations for assessing airflow limitation.
- A spirometer allows you to verify that the patient has performed the manoeuvre correctly and to generate a precise permanent record of results.

Spirometry helps to diagnose asthma and assess asthma control, by allowing to:

- Assess change in airflow limitation.
- Measure the degree of airflow limitation compared with predicted normal airflow (or with personal best in patients who have previously undergone spirometry).
- Most adults, and children over 7 years old, can perform spirometry. Accurate measurement of respiratory function is necessary to assess and manage asthma. Measurements taken both before and after administration of a short-acting beta2 agonist (SABA) bronchodilator allowed:

- diagnose airflow limitation
- measure the degree of airflow limitation
- monitor the effects of treatment
- demonstrate the presence and reversibility of airflow limitation to the patient
- Provide objective feedback to the patient about the presence and severity of asthma (Harman J. *et al*., 2006)

1.6 Diagnostic Challenges

I. Cough-variant asthma: Some patients with asthma have chronic cough (frequently occurring at night) as their principal, if not only, symptom. For these patients, documentation of lung function variability and airway hyper-responsiveness are particularly important.

II. Exercise-induced bronchoconstriction: Physical activity is an important cause of asthma symptoms for most asthma patients, and for some (including many children) it is the only cause. Exercise testing with an 8-minute running protocol can establish a firm diagnosis of asthma.

III. Children 5 Years and Younger: Not all young children who wheeze have asthma. In this age group, the diagnosis of asthma must be based largely on clinical judgment, and should be periodically reviewed as the child.

IV. Occupational asthma: Asthma acquired in the workplace is a diagnosis that is frequently missed. The diagnosis requires a defined history of occupational exposure to sensitizing agents; an absence of asthma symptoms before beginning employment; and a documented relationship between symptoms and the workplace improvement in symptoms away from work and worsening of symptoms upon returning to work.

(Harman J. and Markham S., 2006)

1.7 CLASSIFICATION OF ASTHMA

The National Asthma Education and Prevention Program have classified asthma as:

- Intermittent asthma
- Mild persistent asthma
- Moderate persistent asthma
- Severe persistent asthma

These classifications are based on severity, which is determined by symptoms and lung function tests. You should be assigned to the most severe category in which any feature occurs (GINA, 2005).

1.7.1 Intermittent asthma

Asthma is considered intermittent if without treatment any of the following are true:

- Symptoms (difficulty breathing, chest tightness, wheezing, and coughing):
    - Occur on fewer than 2 days a week.
    - Do not interfere with normal activities.
- Night time symptoms occur on fewer than 2 days a month.

Lung function tests and peak expiratory flow (PEF) are normal when the person is not having an asthma attack. The results of these tests are 80% or more of the expected value and vary little (PEF varies less than 20%) from morning to afternoon (GINA, 2005).

1.7.2 Mild persistent asthma

Asthma is considered mild persistent if without treatment any of the following are true:

- Symptoms occur on more than 2 days a week but do not occur every day.
- Attacks interfere with daily activities.
- Night time's symptoms occur 3 to 4 times a month.

Lung function tests are normal when the person is not having an asthma attack. The results of these tests are 80% or more of the expected value and may vary a small amount (PEF varies 20% to 30%) from morning to afternoon (GINA, 2005).

1.7.3 Moderate persistent asthma

Asthma is considered moderate persistent if without treatment any of the following are true:

- Symptoms occur daily. Inhaled short-acting asthma medication is used every day.
- Symptoms interfere with daily activities.
- Night time's symptoms occur more than 1 time a week, but do not happen every day.

Lung function tests are abnormal (more than 60% to less than 80% of the expected value), and PEF varies more than 30% from morning to afternoon (GINA, 2005).

1.7.4 Severe persistent asthma

Asthma is considered severe persistent if without treatment any of the following are true:

- Symptoms:
    - Occur throughout each day.
    - Severely limit daily physical activities.
- Night time's symptoms occur often, sometimes every night.

Lung function tests are abnormal (60% or less of expected value), and PEF varies more than 30% from morning to afternoon (GINA, 2005).

	Daytime asthma symptoms	**Night-time symptoms**	**Exacerbations**	**Spirometry**
Intermittent	Less than weekly	Less than 2 per month	• Infrequent • Brief	FEV_1 at least 80% predicted FEV_1 variability less than 20%
Mild persistent	More than weekly and less than daily	More than 2 per month but not weekly	• Occasional • May affect activity or sleep	FEV_1 at least 80% predicted FEV_1 variability less than 20-30%
Moderate persistent	Daily	Weekly or more often	• Occasional • May affect activity or sleep	FEV_1 at least 60-80% predicted FEV_1 variability more than 20%
Severe persistent	• Daily • Physical activity is restricted	Frequent	• Frequent	FEV_1 60% predicted or less FEV_1 variability more than 30%

Table 1.1: Classification of asthma in a patient with untreated, newly diagnosed asthma (GINA, 2005)

Daily treatment requirement (includes pm SABA)				
Clinical features and lung function	**No inhaled ICS**	**Low dose ICS**	**Low to medium dose ICS and LABA**	**High dose ICS+ LABA+ other agents**
Any of: • Daytime symptoms occur less than once per week • Night-time symptoms occur less than twice per month • Exacerbations are brief • FEV_1 between episodes is at least 80% predicted and 90% personal best	Intermittent	Mild persistent	Moderate Persistent	Severe persistent
Any of: • Daytime symptoms occur less than once per week but not every day • Night-time symptoms more than twice per month but not weekly • FEV_1between episodes is more than 80% predicted and 90% personal best	Mild persistent	Moderate Persistent	Severe persistent	Severe persistent
Any of: • Daytime symptoms daily • Night-time symptoms at least weekly • Exacerbations affect sleep/activity • SABA use daily • FEV_1 is 60-80% predicted and 70-90% personal best.	Moderate Persistent	Moderate Persistent	Severe persistent	Severe persistent
Any of: • Daytime symptoms every day and restricted physical activity • Night-time symptoms frequent • Exacerbations are frequent • FEV_1 is less than 60% predicted and less than 70% personal best.	Severe persistent	Severe persistent	Severe persistent	Severe persistent

Table 1.2: Classification of asthma severity in a patient with treated asthma (GINA, 2005).

1.8 Pharmacotherapy of asthma:

1.8.1 Medication Types

- Long term control medications
- Quick relief medications
- Adjuvant therapy (Asthma Australia, 2015).

1.8.1.1 Long-Term Control Medications

Used daily to achieve and maintain control of persistent asthma.

• **Corticosteroids**. Inhaled corticosteroids (ICSs) are the most consistently effective long-term control medication at all steps of care for persistent asthma. Short courses of oral systemic corticosteroids are often used to gain prompt control of asthma. Oral corticosteroids are used long term to treat patients who require step 6 care (severe persistent asthma).

• **Cromolyn sodium and nedocromil** are used as alternative, but not preferred, medication for patients requiring step 2 care (mild persistent asthma).

• **The immunomodulator Omalizumab (anti-IgE)** is used as adjunctive therapy for patients ≥12 years of age who have sensitivity to relevant allergens and who require step 5 or step 6 care (severe persistent asthma). Referral to a specialist is recommended for the use of omalizumab and clinicians should be prepared and equipped to identify and treat anaphylaxis that may occur.

• **Leukotriene modifiers**, including montelukast, zafi-rlukast and zileuton, are alternative, but not preferred, therapy for patients who require step 2 care (mild persistent asthma). They can be used as adjunctive therapy with ICSs, but for patient's ≥12 years of age, they are not preferred adjunctive therapy compared to long-acting beta2-agonists (LABAs) (Franks T. *et al.*, 2005).

1.8.1.2 Quick-Relief Medications

These medications are used to treat acute symptoms and exacerbations.

• **Anticholinergic** may provide additive benefit t to short acting beta2-agonist (SABA) in the emergency care setting. They may be used as an alternative to patients who do not tolerate SABA.

• **SABAs** are the treatment of choice for relief of acute symptoms and prevention of EIB. Use of SABA > 2 times a week generally indicates inadequate asthma control.

• Systemic corticosteroids are used for moderate and severe exacerbations in addition to SABA to speed recovery and prevent exacerbations (Franks T. *et al*., 2005).

1.8.1.3 Adjuvent therapy:

LABAs (salmeterol and formoterol), inhaled bronchodilators with a duration of at least 12 hours, are not to be used as mono therapy for long-term asthma control. They are used in combination with ICSs in step 3 care (moderate or severe persistent asthma) or higher in children ≥5 years of age and in adults, and in step 4 (severe persistent asthma) or higher in children 0-4 years of age. They are the preferred therapy to combine with ICSs in patient's ≥12 years of age.

• **The methyl xanthine theophylline** is a mild to moderate bronchodilator used as alternative, but not preferred therapy, for step 2 care (mild persistent asthma) or as adjunctive therapy with ICS in patients ≥5 years of age (Franks T. *et al.,* 2005).

1.8.2 Delivery devices

Medications used to treat asthma are usually administered by inhalation. In terms of the benefit: harm ratio, inhaled drug delivery is superior to oral or parenteral delivery for SABAs, anticholinergic, LABAs and ICS.

• Two different methods of inhalation are used:

• Metered-dose inhaler (MDI) with or without the use of a spacer.

• Dry-powder inhaler (DPI).

• Provided the devices are used correctly, there is no evidence of long-term clinical advantage of one device over another.

• In general, patients with adequate aspiratory force and adequate hand-lung coordination can use either a DPI or an MDI. For older patients who have inadequate aspiratory force and/or poor coordination, use of an MDI with a spacer is preferred. Alternatively, a breath-activated MDI may warrant consideration. • A DPI or an MDI used with a spacer may reduce the pharyngeal disposition of medication and may reduce the local effects of ICS. However; there is no evidence that these devices reduce the systemic adverse effects of ICS, possibly because systemic absorption occurs as much through the bronchial circulation as it does through oral or gastrointestinal absorption (Franks T. *et al*., 2005).

1. Medication Delivery for Young Children				
Route of Administration	**<2 Years**	**2-4 Years**	**5-7 Years**	**8 Years and older**
MDI, small-volume spacer and mask	Yes	Yes		
MDI, small-volume spacer and mouthpiece		Yes		
Dry powder device			Yes	Yes
Breath-activated device			Possible	Yes
MDI and large-volume spacer			Yes	Yes
MDI (alone)				Yes (but spacer preferred especially for ICS)

Table1.3: Devices for children (Harman J. *et al.*, 2006)

1.9 Management

1.9.1 Principles of Pharmacotherapy in children and adolescents

Most young children have infrequent asthma episodes, which can be managed with bronchodilators as needed. They do not require any long-term preventive medications. However, for children of any age who have obvious and recurrent asthma symptoms, anti-inflammatory agents are currently the most effective long-term preventive

Medications and are effective in reducing asthma attacks. Whilst the efficacy of ICS in children has been clearly demonstrated, the dose–response curves have not been

Well described over the range of asthma severities seen in children. The lowest dose of ICS compatible with maintaining disease control should be used.

• Prescribing a SABA as reliever therapy for all children with symptomatic asthma.

• In children, given preventer medication with low dose ICS, montelukast or inhaled cromolyne.

• Most young children have infrequent asthma episodes, which can be managed with

Bronchodilators as needed and do not require any long-term preventive medications.

• Most young children have infrequent asthma episodes, which can be managed with Bronchodilators as needed and do not require any long-term preventive medications.
• In children, ICS doses greater than 250 mcg BDP–HFA or equivalent should be prescribed only on specialist advice. _
• Once control is achieved, step down the dose of ICS to the lowest dose at which effective control of asthma is maintained. _
• There is limited evidence for the efficacy of LABAs in children.

Most young children have infrequent asthma episodes, which can be managed with bronchodilators as needed. They are not requiring any long-term preventive medications. However, for children of any age who have obvious and recurrent asthma symptoms, anti-inflammatory agents are currently the most effective long-term preventive
Medications and are effective in reducing asthma attacks. Whilst the efficacy of ICS in children has been clearly demonstrated, the dose–response curves have not been well described over the range of asthma severities seen in children. The lowest dose of ICS compatible with maintaining disease control should be used (Harman J. *et al.,* 2006).

1.9.3 Other medications and asthma

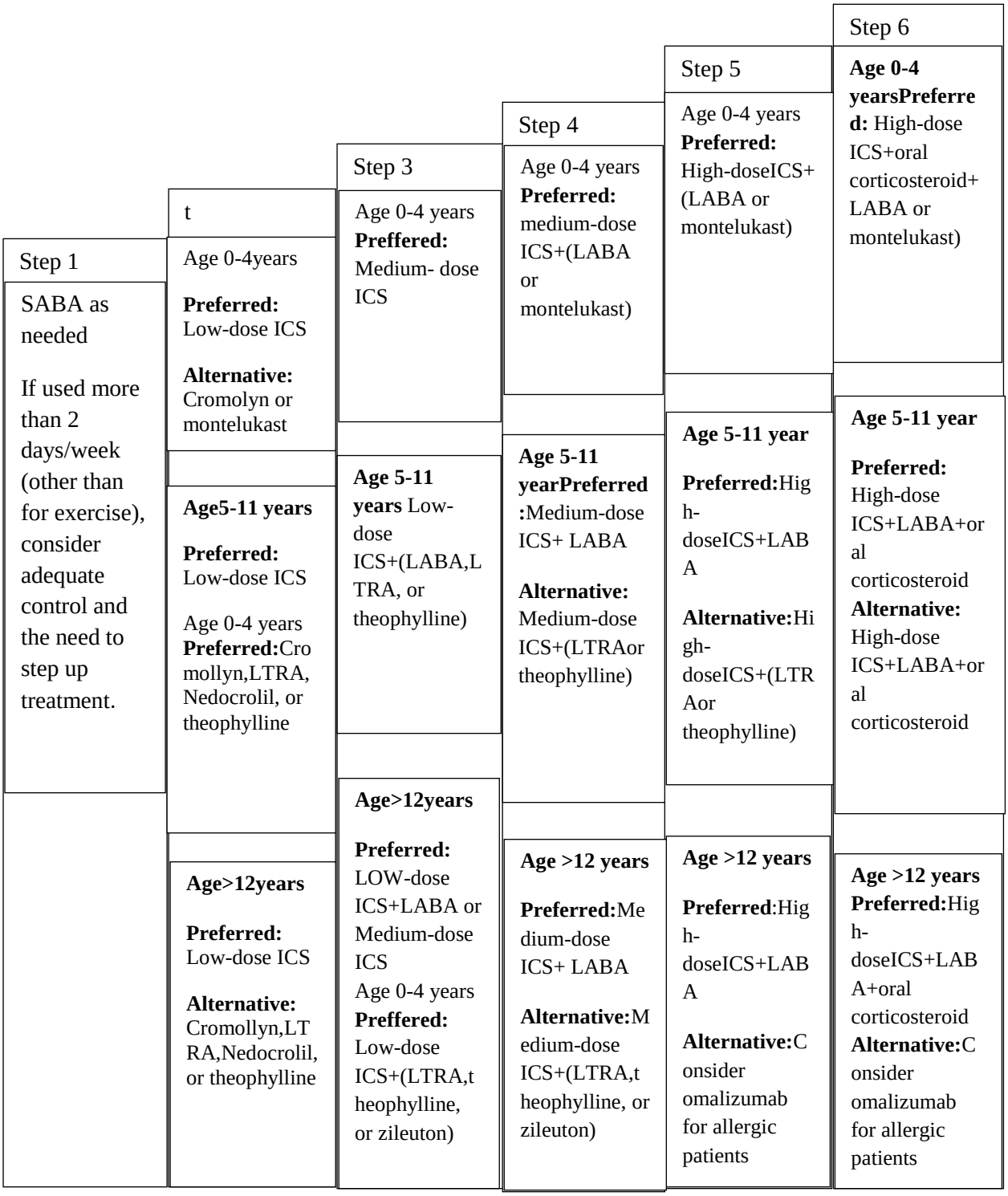
Antibiotics

• Antibiotics should be reserved for specific infections and are therefore rarely indicated in the treatment of asthma exacerbations.
• Mucus hyper secretion and a productive cough are a frequent manifestation of asthma. Discoloured sputum may be due to allergic inflammation and should not be interpreted as an indication of infection in the absence of other symptoms or signs.

Antihistamines

• Antihistamines may be used to treat associated nasal and other allergy symptoms.
• Older antihistamines are effective but also have significant ant cholinergic effects, which can lead to sedation, reduced mental alertness and drying up of secretions. Less sedating antihistamines (Cetirizine, Fxofenadine, Loratadine and Desloratadine) have minimal or no anticholinergic effects and are the preferred option for most people (Garrison M., 2011).

1.9.2Stepwise approach for adjusting treatment:



ICS: inhaled corticosteroid

LABA: Long acting β2 agonist

LTRA: Leukotriene modifier antagonist

SABA: Short-acting β2 agonist

Table 1.4: Stepwise approach for adjusting asthma (Kesterson *et al.*, 2010).

1.9.4 Therapies not recommended for treating asthma attacks include:

- Sedatives (strictly avoid)
- Mucolytic drugs (may worsen cough)
- Chest physical therapy/physiotherapy (may increase patient discomfort)
- Hydration with large volumes of fluid for adults and older children (may be necessary for younger children and infants)
- Antibiotics (do not treat attacks but are indicated for patients who also have pneumonia or bacterial infection such as sinusitis).
- Epinephrine/adrenaline (may be indicated for acute treatment of anaphylaxis and angioedema but is not indicated for asthma attacks) (Harman J. *et al*., 2006).

1.9.5 Summary of steps in emergency care of a child with acute asthma

1. Taken a brief history and perform a rapid physical examination.

2. Given Salbutamol via MDI plus spacer immediately: usually 6 puffs for children under 6 years and 12 puffs for children 6 years and over. If the patient is acutely distressed, give immediately.

• The MDI used with a spacer has replaced the nebuliser as the standard method of delivering SABAs in hospital-based care of children with acute asthma.

• Each puff should be given separately: the spacer should only be loaded with one puff at a time.

• The total dose (up to 12 puffs) should be based on medical assessment in addition to the child's age. With experience, parents learn to judge SABA dose requirement.

3. Complete a full assessment and initiate other treatment, including systemic corticosteroids and oxygen as indicated.

• Adrenaline may be indicated if asthma occurs as part of an anaphylactic reaction, depending on severity.

• There is now convincing evidence that intravenous magnesium sulphate provides additional benefit in children with severe asthma treated with bronchodilators and corticosteroids. Magnesium sulphate has an excellent safety profile and its place in the management of acute severe asthma is similar to that of aminophylline.

4. Closely monitor response to treatment and repeat SABA as indicated (American Lung Association, 2012)

1.10 Risk factors for asthma-related death include:

- Previous severe exacerbation (e.g., intubation or ICU admission for asthma)
- Two or more hospitalizations or >3 ED visits in the past year
- Use of >2 canisters of short-acting beta2-agonist (SABA) per month
- Difficulty perceiving airway obstruction or the severity of worsening asthma
- Low socioeconomic status or inner-city residence
- Illicit drug use
- Major psychosocial problems or psychiatric disease
- Comorbidities, such as cardiovascular disease or other 10 chronic lung disease
- Hay fever (allergic rhinitis) and other allergies -- this is the single biggest risk factor;
- Eczema: another type of allergy affecting the skin; and
- Genetic predisposition: a parent, brother, or sister also has asthma (Kesterson *et al*., 2010).

1.11 Asthma Management:

1.11.1 Strategies for avoiding common allergens and pollutants.

Avoidance measures that improve control of asthma and reduce medication needs:

Tobacco smoke: Stay away from tobacco smoke. Patients and parents should not smoke.

Drugs, foods, and additives: Avoid if they are known to cause symptoms.

Occupational sensitizers: Reduce or, preferably, avoid exposure to these agents, Reasonable avoidance measures that can be recommended but have not been shown to have clinical benefit

House dust mites: Wash bed linens and blankets weekly in hot water and dry in a hot dryer or sun. Encase pillows and mattresses in air-tight covers. Should be replaced carpets with hard flooring, especially in sleeping rooms. (If possible, use vacuum cleaner with filters. Use acaricides or tannic acid to kill mites--but make sure the patient is not at home when the treatment occurs.

Animals with fur: Use air filters. (Remove animals from the home, or at least from the sleeping area. Wash the pet.)

Insects: Clean home thoroughly and often. Use pesticide spray--but make sure the patient is not at home when spraying occurs.

Outdoor pollens and mold: Close windows and doors and remain indoors when pollen and mold counts are highest.

Indoor mold: Reduce dampness in the home; clean any damp areas frequently.

Smoke: Smoke produced by stove should be removed by exhaust fan (Leuenberger P. *et al.*, 1998)

1.11.2 Home Management

Incorporate all four components of asthma care, including assessment and monitoring, patient education, environmental control and medications, to effectively manage asthma exacerbations. Early treatment of exacerbations at home is the best strategy for patient management. Instruct patients how to:

• Use a written asthma action plan that notes when and how to treat signs of an exacerbation. A peak flow based plan may be useful for patients who have difficulty perceiving airflow obstruction or have a history of severe exacerbations.

• Recognize early signs and symptoms of an exacerbation, including worsening PEF.

• Adjust medications (increase SABA and, in some cases, add a short course of oral systemic corticosteroids).

• Remove or avoid contact with allergens or environmental irritants that may contribute to the exacerbation.

• Monitor response to treatment and seek immediate medical care if there is serious deterioration in symptoms or PEF or no response to treatment.

There are no studies to indicate the effectiveness of home management techniques such as: drinking large volumes of liquids; breathing warm moist air; or using over-the counter medications such as antihistamines or cold medicines. These techniques should not be recommended since they may delay patients from seeking appropriate medical care (Akdis C., 2013).

1.11.3 Special considerations in managing asthma:

Pregnancy: During pregnancy the severity of asthma often changes and patients may require close follow-up and adjustment of medications. Pregnant patients with asthma should be advised that the greater risk to their baby lies with poorly controlled asthma, and the safety of most modern asthma treatments should be stressed. Acute exacerbations should be treated aggressively to avoid fatal hypoxia.

Obesity: Management of asthma in the obese should be the same as patients with normal weight. Weight loss in the obese patient improves asthma control, lung function and reduces medication needs.

Surgery: Airway hyper-responsiveness, airflow limitation, and mucus hyper-secretion predispose patients with asthma to intra operative and postoperative respiratory complications, particularly with thoracic and upper abdominal surgeries. Lung function should be evaluated several days prior to surgery, and a brief course of gluco-corticosteroids prescribed if FEV1 is less than 80% of the patient's personal best.

Rhinitis, Sinusitis, and Nasal Polyps: Rhinitis and asthma often coexist in the same patient, and treatment of rhinitis may improve asthma symptoms. Both acute and chronic sinusitis can worsen asthma, and should be treated. Nasal polyps are associated with asthma and rhinitis, often with aspirin sensitivity and most frequently in adult patients. They are normally quite responsive to topical gluco-corticosteroids.

Occupational asthma: Pharmacologic therapy for occupational asthma is identical to therapy for other forms of asthma, but is not a substitute for adequate avoidance of the relevant exposure. Consultation with a specialist in asthma management or occupational medicine is advisable.

Respiratory infections: Respiratory infections provoke wheezing and increased asthma symptoms in many patients. Treatment of an infectious exacerbation follows the same principles as treatment of other exacerbations.

Gastroesophageal reflux: Gastroesophageal reflux is more common in patients with asthma compared to the general population. However, treatment with proton pumps inhibitors, H2 antagonists or surgery fail to improve asthma control.

Aspirin-induced asthma: Up to 28 percent of adults with asthma, but rarely children, suffer from asthma exacerbations in response to aspirin and other non-steroidal anti-inflammatory drugs. The diagnosis can only be confirmed by aspirin challenge, which must be conducted in a facility with cardiopulmonary resuscitation capabilities. Complete avoidance of the drugs that cause symptoms is the standard management.

- **Anaphylaxis:** Anaphylaxis is a potentially life-threatening condition that can both mimic and complicate severe asthma. Prompt treatment is crucial and includes oxygen, intramuscular epinephrine, injectable antihistamine, intravenous hydrocortisone, and intravenous fluid (Hurd S. *et al*., 2006).

1.12.1 Factors contributing to the development of asthma:

Primary Prevention refers to preventing the onset of diseases. There are some strategies for preventing occupational asthma.

Nutrition

Breast-feeding

Despite the existence of many studies reporting a beneficial effect of breast-feeding on asthma prevention, result are conflicting, and caution should be taken in advising families that breast feeding will prevent asthma. Breast-feeding decrease wheezing episodes in early life; however it may not prevent development of persistent asthma. Regardless of its effect on development of asthma, breast-feeding should be encouraged for all of its other positive benefits.

Vitamin D

Intake of Vitamin D maybe through diet, dietary supplementation or sunlight. A systemic review of cohort, case control and cross sectional studies concluded that maternal intake of vitamin D and of vitamin E was associated with lower risk of wheezing illness of children.

Delayed Introduction of solids

Beginning in 1990s, many national paediatric agencies and societies recommended delay of introduction of solid food, especially for children at a high risk for developing allergy.

Current guidelines do not recommended strict avoidance of high-risk food, but carefully controlled prospective studies are needed to conclusively resolve this controversy.

Probiotics

A meta-analysis provided insufficient evidence to recommend probiotics for the prevention of allergic diseases (asthma, rhinitis, and eczema or food allergy).

Pollen

Maternal smoking during pregnancy is the most direct route of pre-natal environmental tobacco smoke exposure. A meta-analysis concludes that pre-natal smoking has its strongest effects on young children, whereas post-natal maternal smoking seemed relevant only to asthma development in older children.

Exposure to outdoor pollens, such as living near a main road, is associated with increased risk of asthma, but one study suggested that this may only be important for children also exposed to tobacco smoke in-uteri and in infancy.

Microbial effects

The ‘hygiene hypothesis’ and the more recently coined ‘microbial hypothesis and ‘biodiversity hypothesis ‘suggest that human interaction with macrobiotic may be beneficial in preventing asthma. For example, there is a lower risk of asthma among children raised on farms with exposure to stable and consumption of raw firm milk than among children of non-farmers. The risk of asthma is reduced in children whose bedrooms have high levels of bacteria derived lipopolysaccharide endotoxins (Boulet *et al*., 2015).

2. Literature Review of Childhood Asthma Management:

2.1 Worldwide variation in prevalence of symptoms of asthma, allergic rhino conjunctivitis, and atopic eczema

The International Study of Asthma and Allergies in Childhood (ISAAC), a monumental study which involved 155 centres in 56 countries was one of the first to reliably compare the prevalence of asthma worldwide. Surveying nearly half a million children 13-14 years of age, this study found great disparities (as high as a 20 to 60-fold difference) in asthma prevalence across the world, with a trend toward more developed and westernized countries having higher asthma prevalence. There are also worldwide disparities in asthma mortality, which is most common in low to middle income countries. Asthma symptoms were most prevalent (as much as 20%) in the United Kingdom, Australia, New Zealand, and Ireland; they were lowest (as low as 2–3%) in Eastern Europe, Indonesia, Greece, Uzbekistan, India, and Ethiopia (ISAAC, 2012).

2.2 Prevalence of childhood asthma

Current research by WHO therefore suggests that the prevalence of childhood asthma has been increasing, and this increased prevalence is greater than that in adults. According to the Centres for Disease Control and Prevention's National Health Interview Surveys, some 9% of US children below 18 years of age had asthma in 2001, compared with just 3.6% in 1980 (see figure). The World Health Organization (WHO) reports that some 8% of the Swiss population suffers from asthma today, compared with just 2% some 25–30 years ago. Although asthma is more common in affluent countries, it is by no means a problem restricted to the affluent; the WHO estimate that there are between 15 and 20 million asthmatics in India. In the U.S., urban residents, Hispanics, and African Americans are affected more than the population as a whole (WHO, 2015).

2.3 Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma

According to Global Asthma Report 2014, around 334 million people have asthma. Among them 14% of the world’s children experience asthma symptoms, 8.6% of young adults (aged 18-45) experience asthma symptoms, 4.5% of young adults have been diagnosed with asthma

and/or are taking treatment for asthma. They have also showed that, the burden of asthma is greatest for children aged 10-14 and the elderly aged 75-79 and Asthma is the 14th most important disorder in the world in terms of the extent and duration of disability (GINA, 2014).

2.4 Asthma Prevalence Report

According to American Lung association, Asthma is one of the most common chronic disorders in childhood, currently affecting an estimated 7.1 million children under 18 years; of which 4.1 million suffered from an asthma attack or episode in 2011. Asthma can be a life-threatening disease if not properly managed. In 2011, 3,345 deaths were attributed to asthma. However, deaths due to asthma are rare among children. The number of deaths increases with age. In 2011, 169 children under 15 died from asthma compared to 633 adults over 85. Asthma is the third leading cause of hospitalization among children under the age of 15. Approximately 29 percent of all asthma hospital discharges in 2010 were in those under 15, however only 20% of the U.S. population was less than 15 years old. (American Lung Association, 2012).

2.5 Asthma Prevalence Report

According to 2014 Georgia Asthma Surveillance Report, among children in Georgia during 2012, the prevalence of lifetime asthma among children 0-17 years was 16% while current asthma prevalence among children in the same age group was 12%. The prevalence of lifetime and current asthma was higher among boys (18.0% and 14% respectively) than was in girls (13.5% and 10.3% respectively), which is in contrast to the results from the adult prevalence when comparing women to men. Black children (18.4%) were significantly more likely to have current asthma than white children (7.8%) (Georgia Department of Public Health, 2014).

2.6 The Prevalence of Asthma in Canadian Children of South Asian Descent

In 2014, researcher Joust Nice Merman and his co-workers Studied on the Prevalence of Asthma in Canadian Children of South Asian Descent and showed that the prevalence of

asthma and wheezing did not differ between children of South Asian descent and non-South Asians living Canada. When compared to the children living in India, the prevalence of asthma, wheeze, and exercise induced wheeze was significantly higher in the South Asian children living in Canada. Higher body mass index of the child, parental smoking, and pet ownership were strongly associated with asthma and wheeze. In contrast to other studies these data suggest that South Asian children living in Canada have similar asthma prevalence to non-South Asian children; both of whom had higher asthma prevalence compared with children residing in South Asia. This suggests that environmental and social factors play a role in asthma prevalence. Risk factors for asthma in children of South Asian descent living in Canada are similar to those of the overall population (Moerman *et al.,* 2014).

2.7 Significant rise of the prevalence and clinical features of childhood asthma in Qingdao China: cluster sampling investigation of 10,082 children

In 2014 scientist Rongjun Lin and his co-workers studied Significant rise of the prevalence and clinical features of childhood asthma in Qingdao China: cluster sampling investigation of 10,082 children which has showed the prevalence of asthma aged 0–14 years in Qingdao China increased significantly based on data obtained ten years ago (2000). The prevalence of asthma in Qingdao children aged 0–14 years was 3.69%. The prevalence among male children was higher than in female ($\chi 2 = 24.53$, $P < 0.01$). Among the asthmatic children, 68.0% had their first attack when they were less than three years old. Moreover, 71.2% once suffered respiratory tract infections. For 95.7% of asthmatic children, the asthma attack was first manifested as cough. Moreover, Asthmatic children who used inhaled corticosteroids (ICS) only accounted for 46%. Respiratory tract infections were the most important precursors of asthma attack. The attack was most commonly manifested as cough. The treatment, especially the use of ICS, was more rational. However, a certain difference was found, which has yet to be contrasted with the Global Initiative for Asthma (GINA) project (Lin *et al*., 2014).

2.8 Parent misperception of control in childhood/adolescent asthma: the Room to Breathe survey

In 2012 Researcher Carroll WD and his Co-researcher conducted a study on Parent misperception of control in childhood/adolescent asthma: the Room to Breathe survey which

has showed that among 1,284 parents of asthmatic children (aged 4-15 years), as well as with the children themselves (aged 8-15 years; n=943), in Canada, Greece, Hungary, the Netherlands, South Africa and the UK. Parents reported mild asthma attacks at least weekly in 11% of children, and serious attacks (requiring oral corticosteroids or hospitalization) at least annually in 35%. Although 73% of parents described their child's asthma as mild or intermittent, 40% of children/adolescents had C-ACT scores $\leq$ 19, indicating inadequate control, and only 14.7% achieved complete Global Initiative for Asthma (GINA)-defined control and just 9.2% achieved Scottish Intercollegiate Guidelines Network (SIGN)/British Thoracic Society (BTS)-defined control. Guideline-defined asthma control was significantly less common than well-controlled asthma using the C-ACT ($p<0.001$). Asthma restricted the child's activities in 39% of families and caused lifestyle changes in 70% and complete asthma control is uncommon in children worldwide (Carroll *et al*., 2012).

2.9 Monitoring and Management of Childhood Asthma in Asian Countries a Questionnaire Study

In 2009 researcher Belle Wong and his co-workers conducted an International Study of Monitoring and Management of Childhood Asthma in Asian Countries which has shown that asthma symptom prevalence is still increasing in parts of Asia. They also observed how well asthma is being managed. In this study Asthma has been shown to start early in life. In Singapore, 11.7% of pre-schoolers aged 4 to 6 years have already been diagnosed with asthma. In fact, 60% of children with asthma develop their symptoms before the age of 3 years. In a cross-sectional study done in Singapore, 22.9% of children in their second year of age already had the asthma-related symptom of wheezing. This study also showed that Inhaled corticosteroid therapy was selected as a first-choice therapy for asthma maintenance in infants by 11.0% (Indonesia) to 81.6% (Sri Lanka) of physicians. In pre-schoolers, it ranged from 10.0% (Indonesia) to 69.4% (Sri Lanka) of physicians, and in older children, it ranged from 24.0% (Indonesia) to 69.4% (Sri Lanka). Again Montelukast use as a first-choice treatment was favoured by 0.0% (Sri Lanka, Philippines) to 42.4% (Taiwan) of respondents in infants. For pre-schoolers, the range was from 1.9% (Indonesia) to 45.3% (Taiwan) of respondents, and in older children, it ranged from 0.0% (India, Sri Lanka) to 19.8% (Taiwan) and 72% (China) (Wong *et al*., 2009).

2.10 Assessment of Parental Knowledge of Paediatric Asthma Triggers

In 2013, Vu, B.Q. studied on "Assessment of Parental Knowledge of Paediatric Asthma Triggers" at CommuniCare Health Centres in San Antonio, TX and showed that there were only two respondents who selected air fresheners as a trigger for their child. No asthma patients have symptoms after ingesting foods or medications. Only 8 respondents (19.5% of total) indicated that their child is exposed to a smoker in the household. About 58% of the respondents (n=24) indicated that their home is 10 years or older. Almost all of the respondents, about 33 out of 41 (80% of total), indicated that their household uses some sort of air freshener. This was the choice most selected by respondents followed by fabric softener sheets and perfume. For the questions asking if they use methods for dust mite control, about 32% of respondents (n=13) said "yes". The final two questions about the ease of the survey and if respondents were willing to do another similar survey for Communicated in the future, 95% and 100% said yes respectively. Overall, parents are more aware of the common triggers like weather changes, cold/flu, and dust. These triggers are often blamed as the cause of their child's asthma symptoms. However, what they do not realize is that common household items like air freshener products and fabric softener sheets are also asthma triggers (Vu B., 2013).

2.11 Patient medication knowledge and adherence to asthma pharmacotherapy: a pilot study in rural Australia

In 2005, Franks et al worked on, "Patient medication knowledge and adherence to asthma pharmacotherapy: a pilot study in rural Australia" and showed study data about participants' knowledge, use, and inhalation device technique. Of participants, 75.9% used preventer medication and the remaining 24.1% used reliever medication only. Of those using preventer medication, 82.5% could distinguish their preventer from a range of asthma medicines. Metered dose inhalers (MDIs) were used by 80% of participants; 23% used a Turbuhaler®; 24% used an Accuhaler®; and 5% used an MDI with a spacer device. The study established poor medication knowledge, suboptimal device technique, and disturbing levels of adherence with management recommendations. Asthma education strategies need to be modified to engage patients with low asthma knowledge to achieve improved patient outcomes. Further, strategies need to motivate patients to use preventer medication during times when they feel well (Franks *et al*., 2005).

2.12 An evaluation of parental knowledge of childhood asthma in a family practice setting

In 1997, Moosa et al performed research on "An evaluation of parental knowledge of childhood asthma in a family practice setting" and showed that an average score of 72% was achieved. Parents were most knowledgeable about aetiology, symptomatology, pathophysiology, precipitants and environmental control. They were less informed about asthma therapy, asthma prognosis and general medical knowledge. In addition, numerous misconceptions were identified, which together with the knowledge deficiencies, could lead to inadvertent non-compliance. Parental concerns centred predominantly on their lack of confidence to manage acute asthma attacks, and fears about asthma prognosis. The study underscores the need for systematic asthma education, especially with regard to acute attack management and preventive medications. In addition, parents must acquire confidence and practical skills to cope with acute attacks (Moosa *et al*., 1997).

2.13 Comparison of parent knowledge, therapy utilization and severity of atopic eczema before and after explanation and demonstration of topical therapies by a specialist dermatology nurse

In 2003, Corck et al studied on, "Comparison of parent knowledge, therapy utilization and severity of atopic eczema before and after explanation and demonstration of topical therapies by a specialist dermatology nurse" and showed that at baseline less than 5% of parents had received/recalled receiving any explanation of the causes of eczema or demonstration of how to apply topical treatments. The eczema was poorly controlled in all children (mean SASSAD 42·9). Of the children, 24% were not being treated with any emollient cream/ointment; the mean use was 54 g weekly. Of the children, 25% were being inappropriately treated with potent or very potent topical steroids. Following repeated education and demonstration of topical therapies by a specialist dermatology nurse, there was an 89% reduction in the severity of the eczema. The main change in therapy utilization was an 800% increase in the use of emollients (to 426 g weekly of emollient cream/ointment) and no overall increase in the use of topical steroids, accounting for potency and quantity used. This study reinforces the importance of specialist dermatology nurses in the management of atopic eczema. It also confirms the opinion of patients, patient support groups, dermatologists and best practice guidelines that the most important intervention in the management of atopic eczema is to spend time to listen and explain its causes and demonstrate how to apply topical therapies (Corck *et al*., 2003).

2.14 The association between Asthma and sleep in urban adolescents with undiagnosed Asthma

In 2015, Scientist Koinis with his co-researcher studied on, "The association between Asthma and sleep in urban adolescents with undiagnosed Asthma" on a total of 349 adolescents (83% girls), with a mean age of 15.8 years, and their primary caregivers participated. Large segments of the sample were Latinos (46%) or African Americans (37%). Adolescents reported on asthma-namely, rate of waking up at night due to asthma-like symptoms and perceived severity of breathing problems-and sleep, specifically sleep-wake behavior problems and daytime sleepiness during activities. Caregivers provided demographic information by telephone. The study showed that night awakenings and perceived severity of breathing problems were each independently associated with sleep-wake behavior problems and daytime sleepiness during activities. Youth report of perceived stress moderated the association between perceived severity of breathing problems and sleep-wake behavior problems, and perceived severity of breathing problems and daytime sleepiness during activities. Results suggest the importance of interventions that consider undiagnosed asthma and its effects on sleep indicators related to daytime functioning in this high risk group of youth. This study highlights the need for interventions that consider asthma severity, nocturnal asthma, and sleep problems among urban adolescents with no asthma diagnosis (Koinis *et al*., 2015).

Significance of the study

Childhood asthma is not distributed evenly throughout the population, and children who grow up in crowded urban neighbor hoods have higher rates of asthma and experience greater morbidity due to asthma. There are several environmental and lifestyle factors associated with urban living that are suspected to promote the development of asthma, particularly in the first few years of life (James E, 2013).

It is vital to reduce the asthma attack morbidities and mortalities by education and prevention. Raising awareness about asthma triggers among guardians of paediatric asthmatic patients could play an integral role in achieving this goal (Vu B., 2013). Patient education is becoming an essential area of service provision, with our increasing population of people with chronic diseases and conditions requiring long-term management in the community.

Although asthma cannot be cured, appropriate management can control the disease and enable people to enjoy a good quality of life. If asthma symptoms are controlled, the patient should have fewer exacerbations, a higher quality of life, lower costs, slower progression of airway remodelling from inflammation, less morbidity, and lower risk of death from asthma (Marks et al, 2014). To effectively participate in their asthma management, patients or parents need to recognize each of their severity, causes behind asthma, routine check-ups by doctors, asthma management plan, medication types, understand their purpose, adhere to their treatment regimen, and be proficient in using the required delivery devices (Prabhakaran *et.al*., 2006).

This study evaluated patient /parent's knowledge of asthma, pharmacotherapy management and adherence (Franks *et al*., 2005). To know the current statistics of patient/parent knowledge and management of childhood asthma in urban area of Bangladesh we decided to conduct a survey in different hospitals of urban area of Bangladesh.

Aims & objectives of the study were:

1. To know the patient/parent knowledge of childhood asthma in Bangladesh.

2. To determine the management of childhood asthma in Bangladesh.

3. Methodology

3.1 Type of study

This research study was a survey based study.

3.2 Study area

This study was done in different hospitals, clinics of Dhaka city. Data from the patients were collected from Dhaka Medical College and Hospital, Bangabandhu Sheikh Mujib Medical University, Dhaka Shishu Hospital, Sir Solimullah Medical College and Hospital, Popular Hospital and Diagnostic Center, Shishu Hospital, Crescent Hospital, Al-Beruni Hospital, Khidmah Hospital. All these hospitals are situated in Dhaka.

3.3 Study population

Data were collected from the target patient population of any pediatric patients who have been diagnosed with asthma, have a history of asthma or wheezes, or come in for asthma. Once these patients have been identified, the guardian of the patient will be asked if they are interested in participating in a quick survey of their knowledge of asthma. They were then briefed that no personal patient information will be requested or documented and that their participation in the survey is strictly voluntary.
The survey was performed on 210 asthma patient. In-door and out-door patients were included in the study. Both the patients and parents were performed.

3.4 Questionnaire development

The questionnaire was developed by some criteria that influence the child asthma in Bangladesh. The questionnaire was prepared based on some important factors like recent history, history of asthma, health care utilization, knowledge of asthma management plan, environmental influence of asthma, prescribed medications by doctors or other health professionals, uses of medication devises, cost of care. These main factors are divided into

subclasses which determine the knowledge and management of childhood asthma among the parents of the patients or patients themselves.

3.5 Data analysis

After collecting all the data, these data were set on the Microsoft Office Excel 2007 and filtered out according to age range, recent history, history of asthma, health care utilization, knowledge of asthma management plan, environmental influence of asthma, prescribed medications by doctors or other health professionals, uses of medication devises, cost of care. So some graphical representations were found that was virtually representation of the targeted subject.

4.1 Age distribution

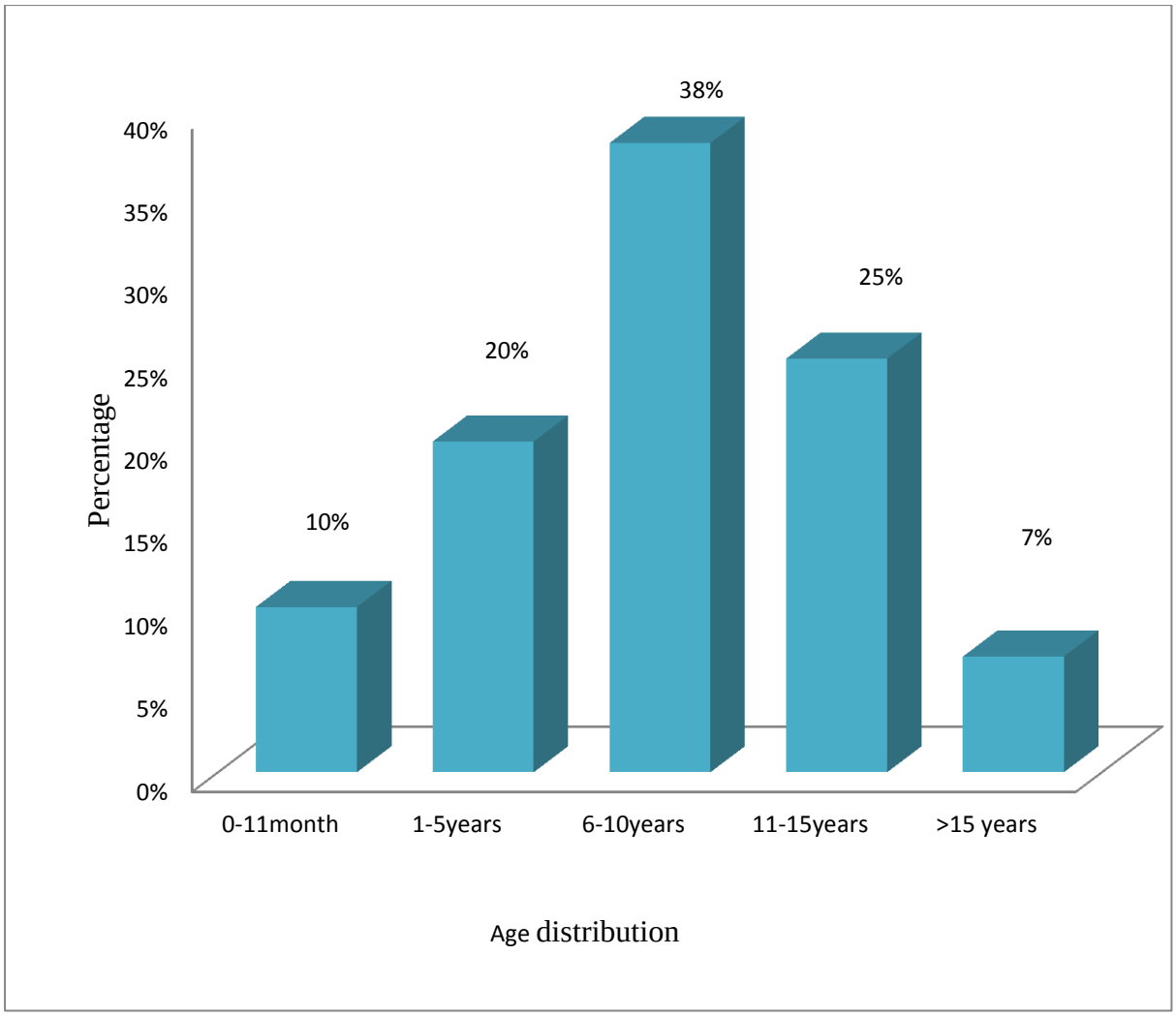


Figure 4.1: Age distribution

In this study, most of the respondents (38%) age range was 6-10 years. Than the effected age range was 11-15 years (25%) and only 7% population's age range was greater than 17.

4.2 First experience of asthma

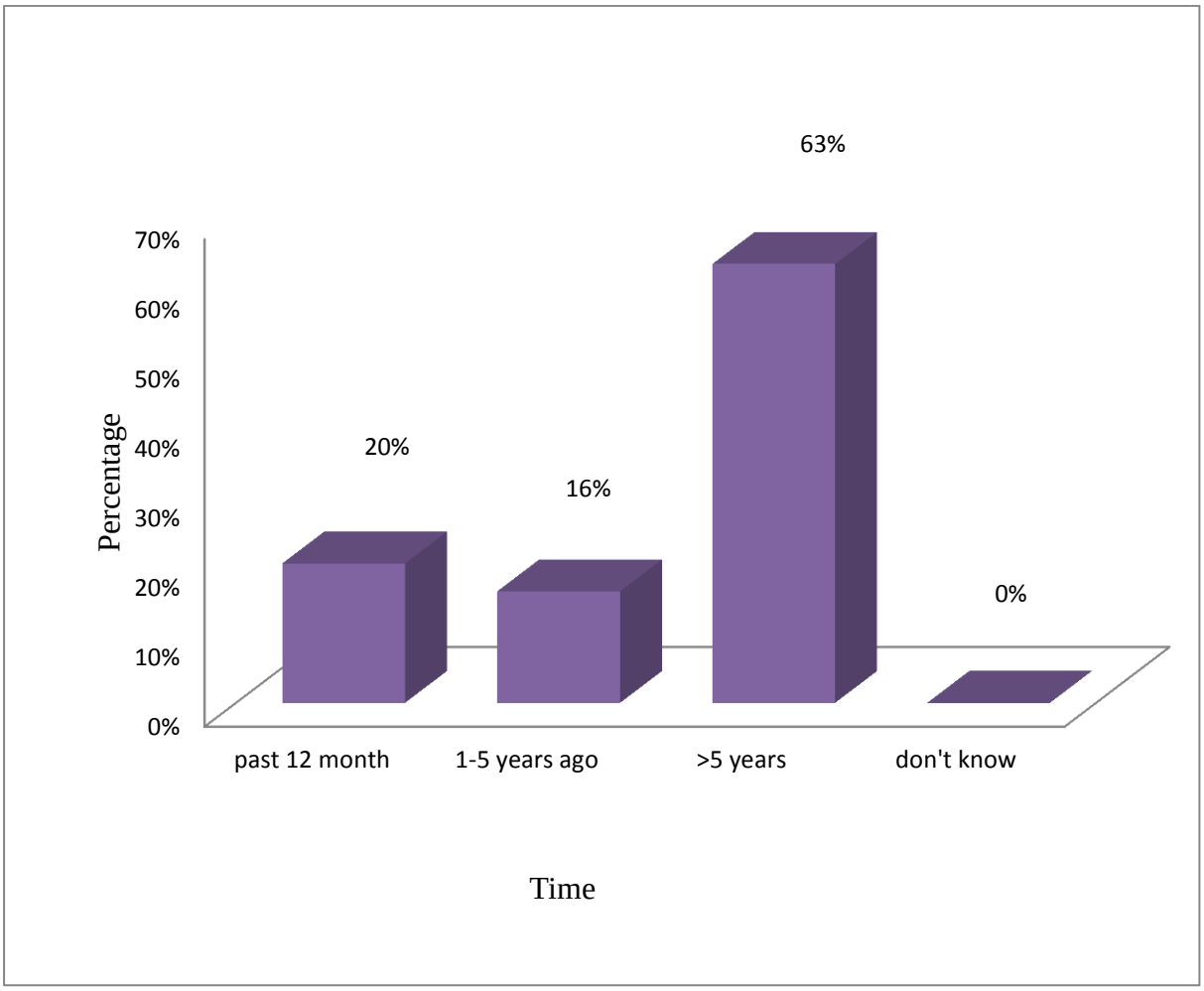


Figure 4.2: First experience of asthma

In this study, we found that, most of the patients (63%) had their first experience of asthma more than 5 years ago. And every respondent knew the time of first experience of asthma maybe because of the sampling error.

4.3 Asthma symptoms occur in last experience

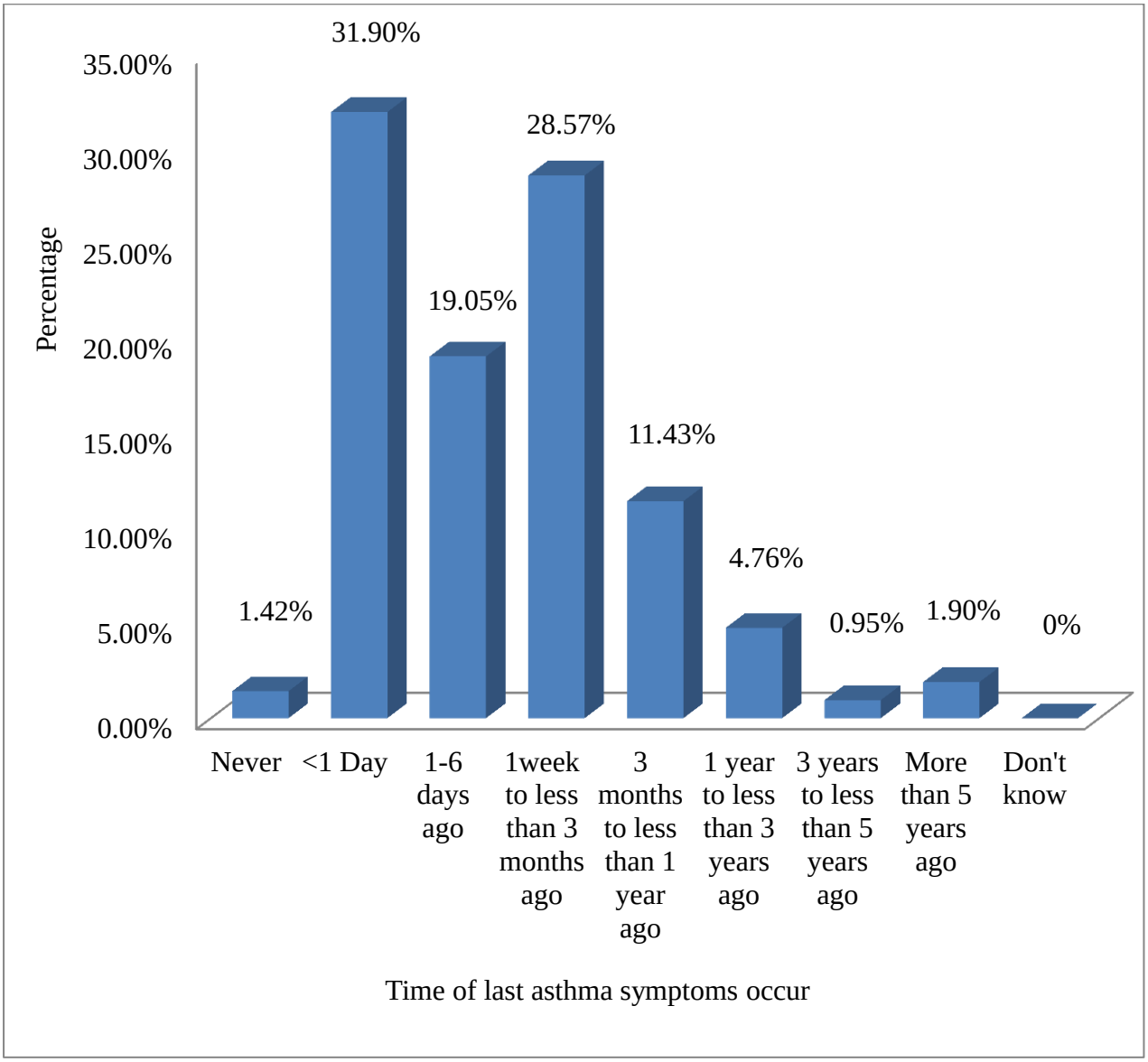


Figure 4.3: Asthma symptoms occur in last experience

It was found that, most of the patient's (79.53%) last experience of asthma symptoms occurred within less than 1 day to 3 months ago. Only 1.9% patients had symptoms more than 5 years ago.

4.4 Last consult duration with doctor

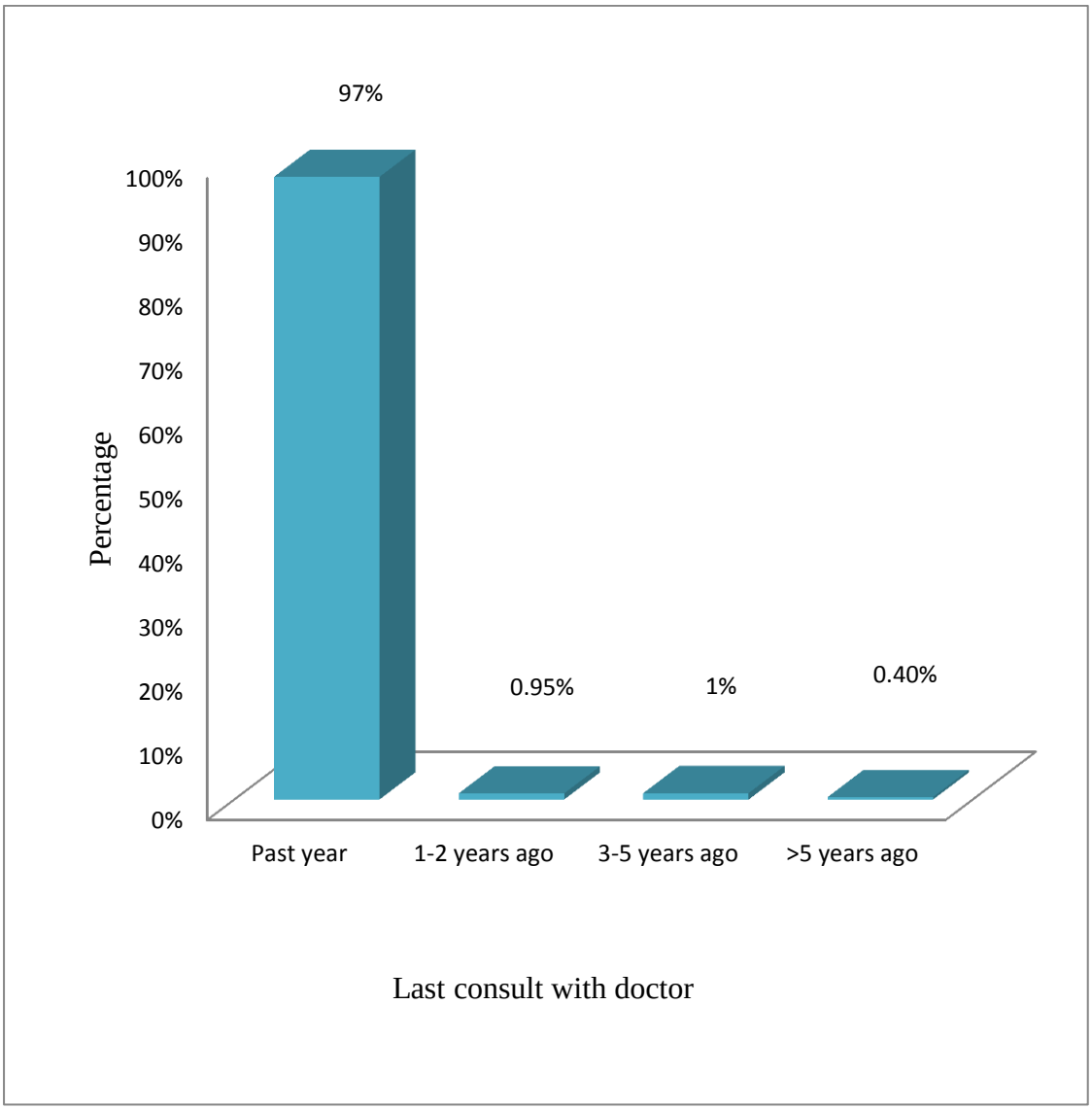


Figure 4.4: Last consult duration with doctor

From our study, we found that, most of the patients or their parents (97%) consulted with doctor or other health professional about asthma. About 95% patient of our survey population consulted with the doctor within the past year as the symptoms were arisen within the same time.

4.5 Last medication consumption

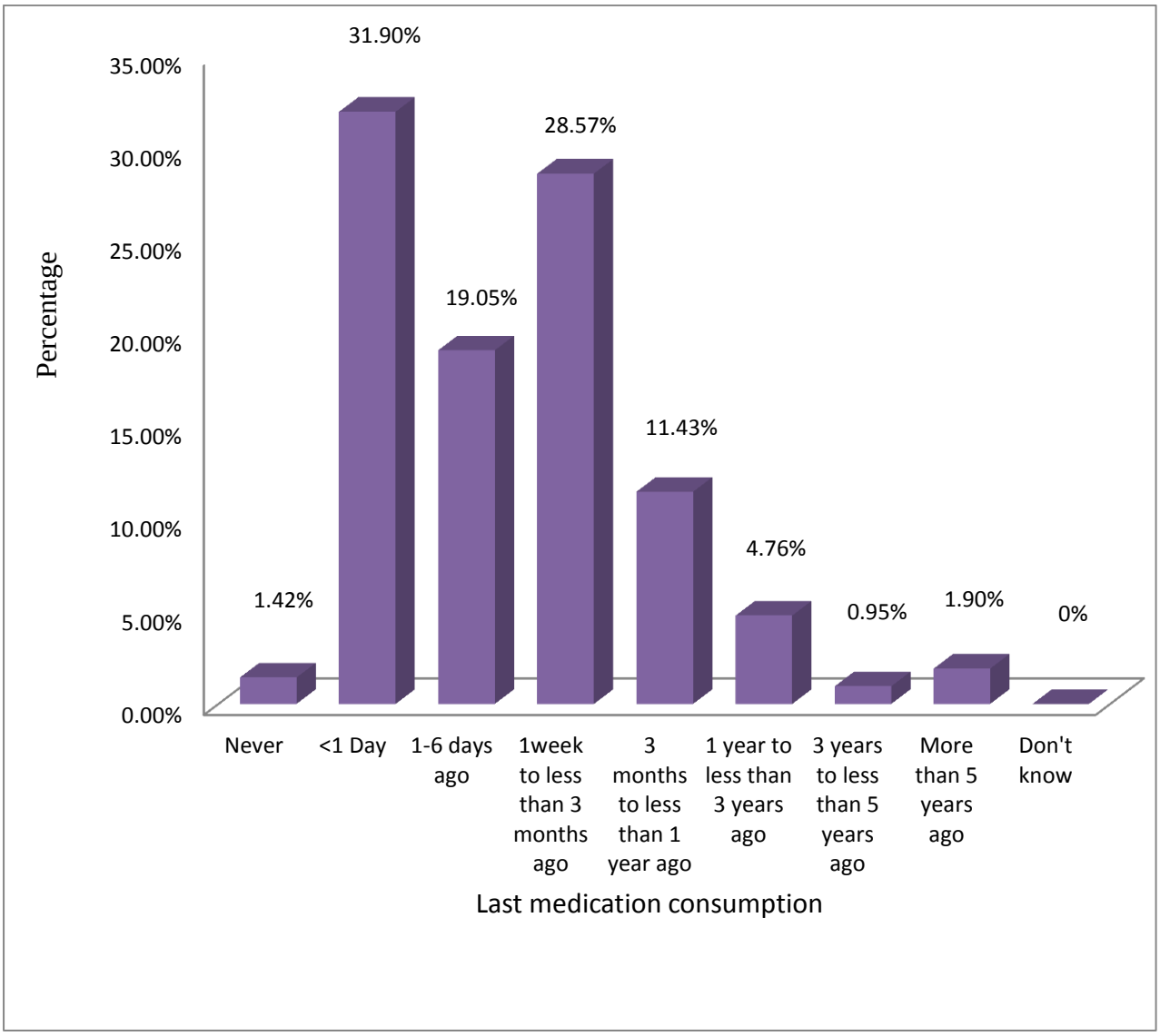


Figure 4.5: Last medication consumption

It was seen that, since most of the patient's (97%) symptoms arising and consulted with the doctor within less than 1 day to 3 months ago, so their medication consumption rate increased on the same period.

4.6 Attack of wheezing frequency in last 12 months

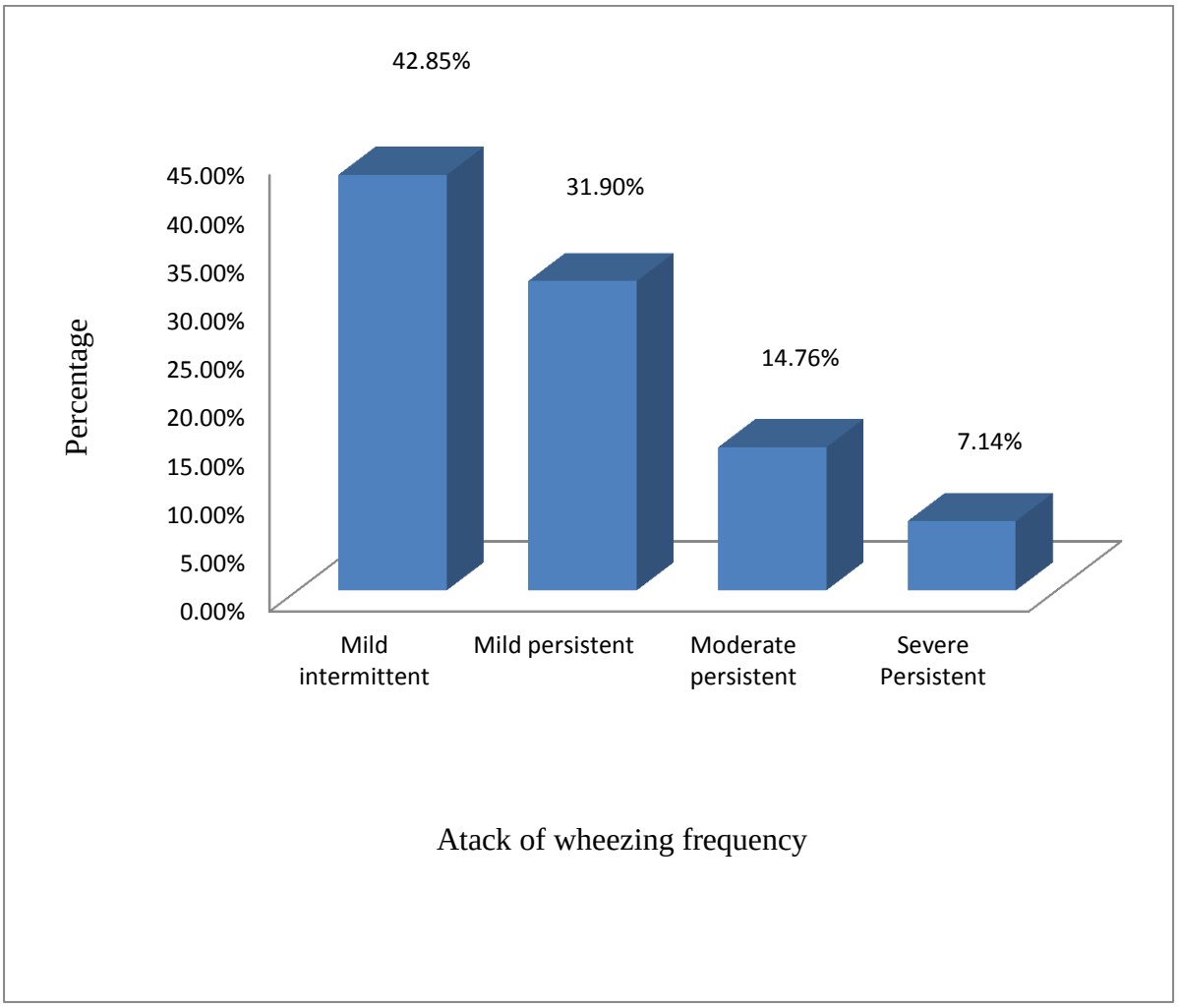


Figure 4.6: Attack of wheezing frequency in last 12 months.

From our study we found that, 42.85% patients had attack of wheezing less than 2 times per week in the last 12 months .So, most of the patients had mild intermittent. About 31.9% patients have mild persistent asthma or they had attack of wheezing more than 2 times per week and 14.76% patients have moderate persistent or they had attack of wheezing daily. Moreover, 7.14% patients have severe persistent or they had attack of wheezing continual.

4.7 Seasonal influence of asthma symptoms

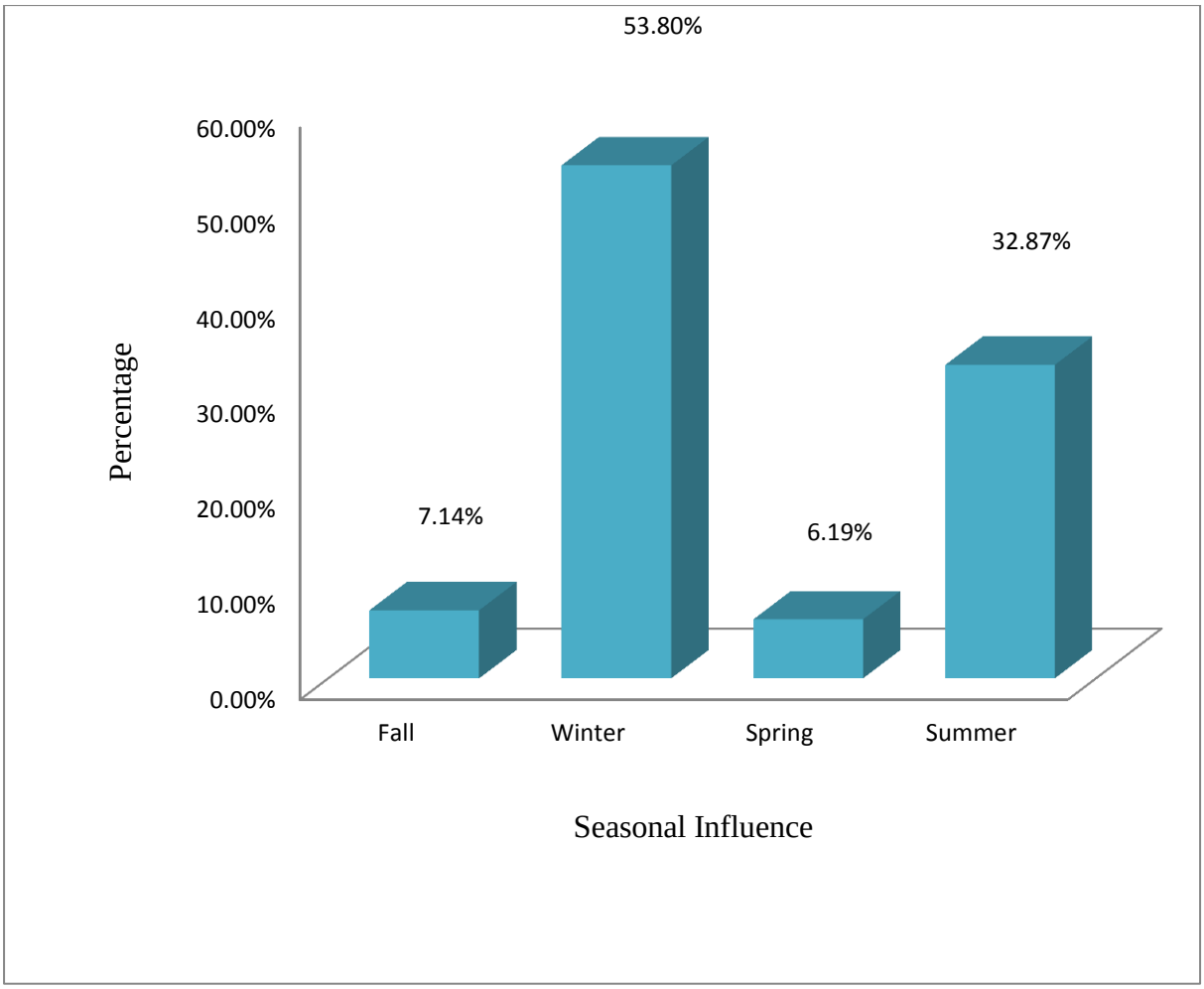


Figure 4.7: Seasonal influence of asthma symptoms

It was seen in our study that, among patients the most seasonal influence of asthma symptoms were in winter (53.80%) and summer season (32.87%). There was a little influence of spring and summer season.

4.8 Difficulty to sleep due to asthma

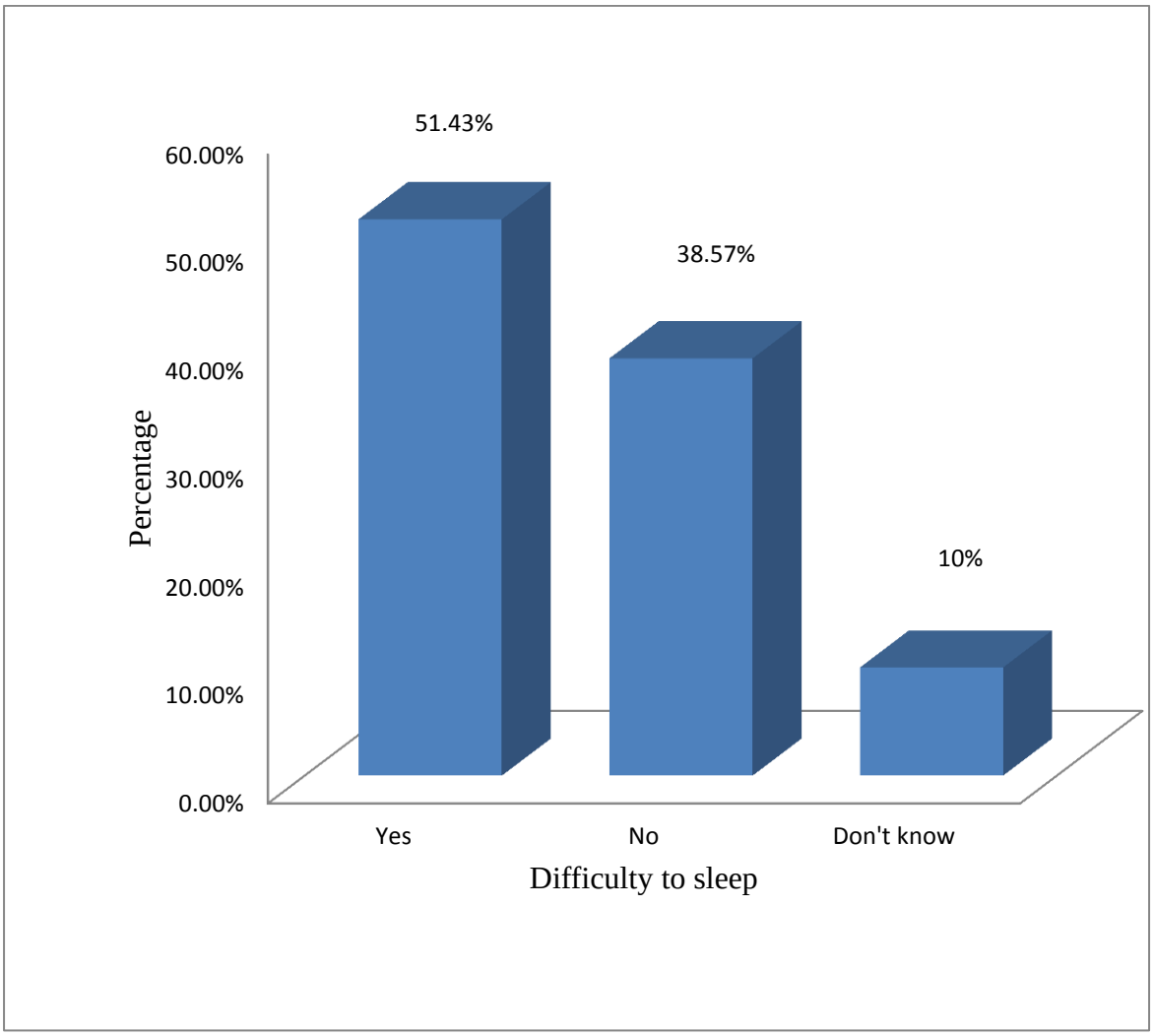


Figure 4.8: Difficulty to sleep due to asthma

Most of the respondents (51%) faced difficulty to stay sleep because of asthma symptoms. Among all patients 38.57% populations didn't face difficulty to stay sleep because of asthma symptoms. But 10 % respondents didn't know about this.

4.9 Took medications on time

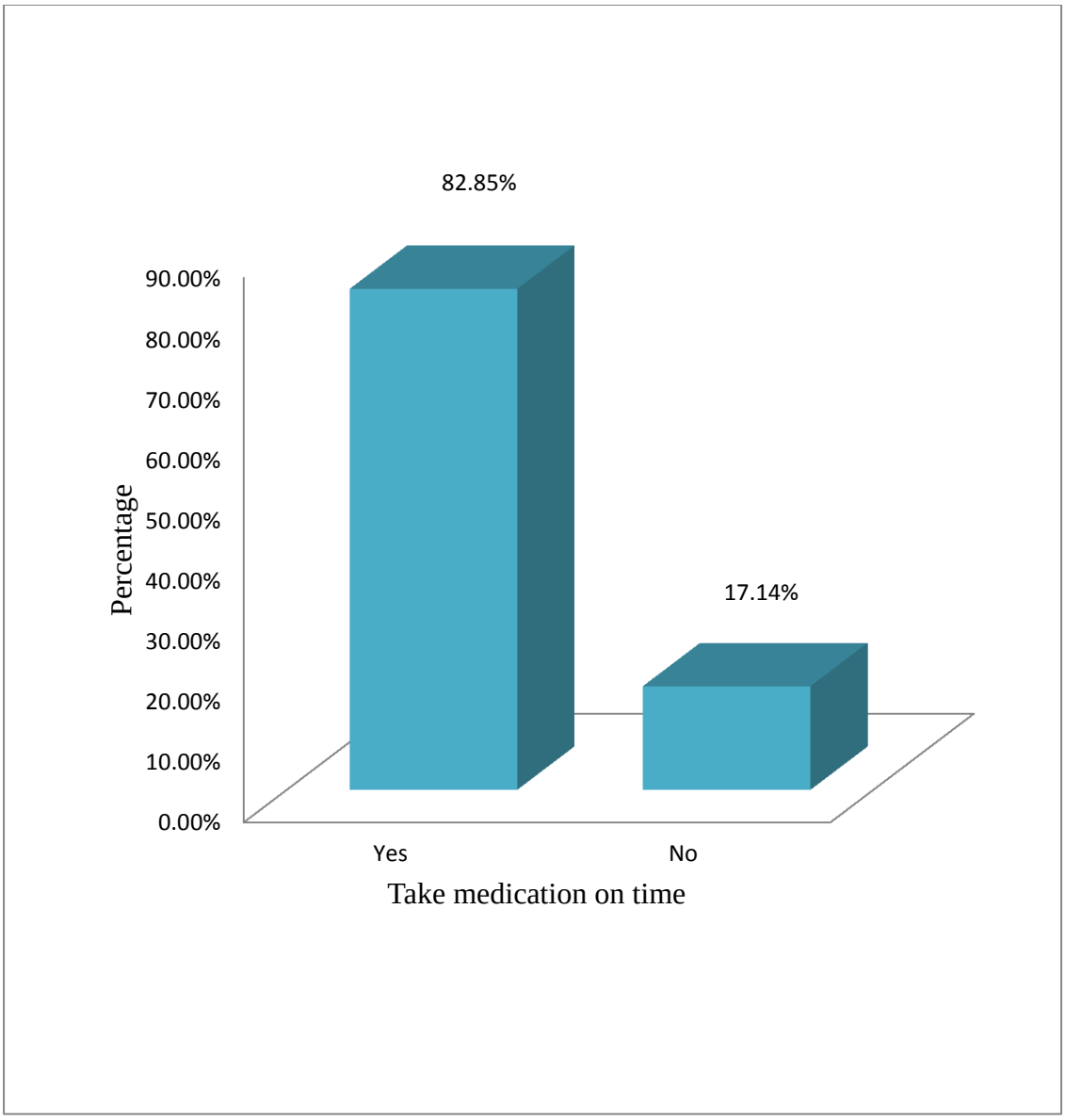


Figure 4.9: Took medications on time

It was seen that, 82.85% patients took their medications on time. And 17.14% patients didn't take their medications on time as all these patients gave a reason that they couldn't afford to buy all types of medications. As a result, the patient had to miss or skip the medications.

4.10 Comparison of recent episodes of asthma with previous attack

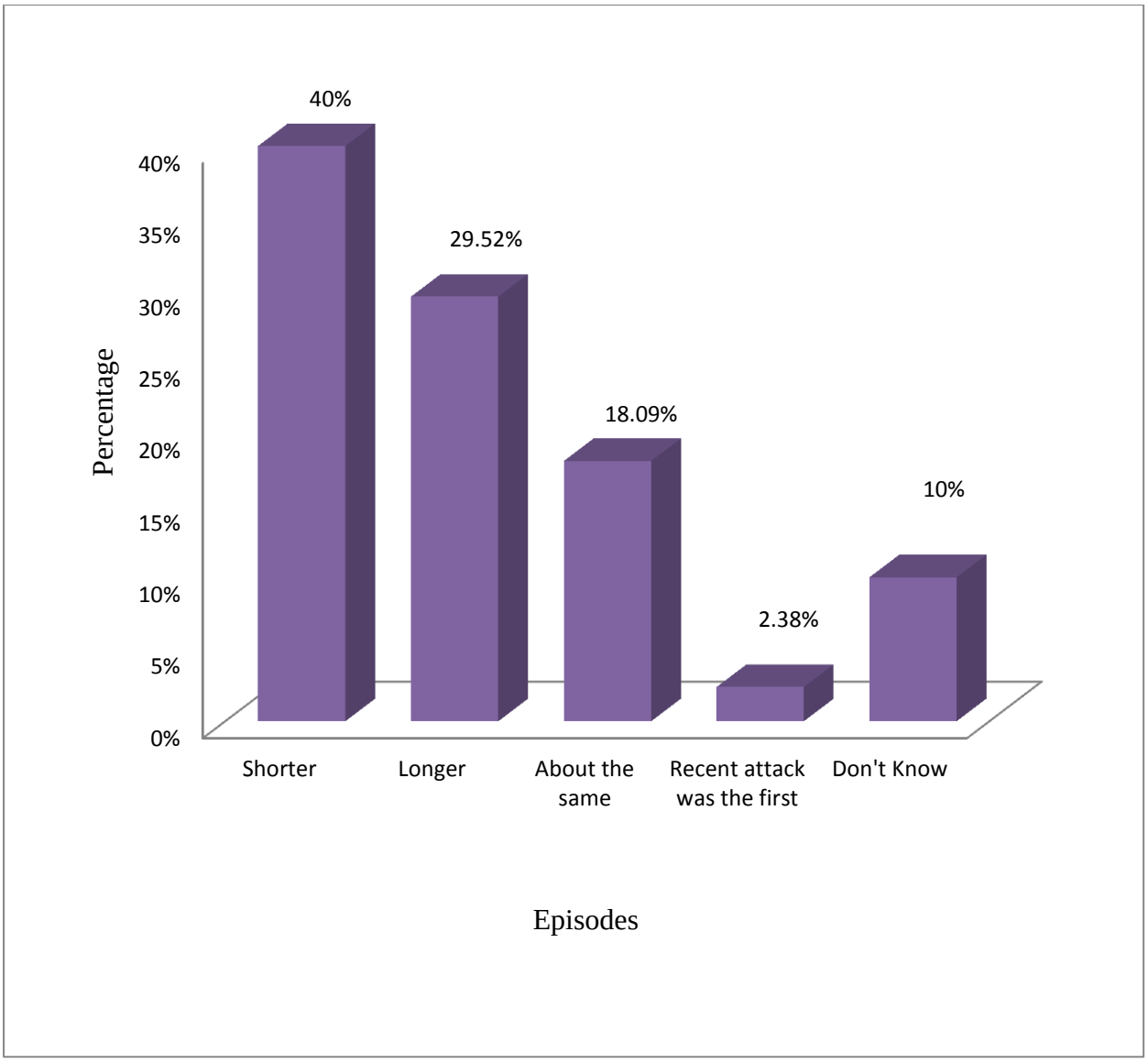


Figure 4.10: Comparison of episodes

In this survey, it was seen that, comparison of recent episodes of asthma with previous attack of patients. Most of the patients (40%) had shorter episodes of asthma than the previous one. Moreover, 29.52% patients had longer episodes of asthma than the previous one. But 10% population didn't know about the duration.

4.11 Professional routine check-up

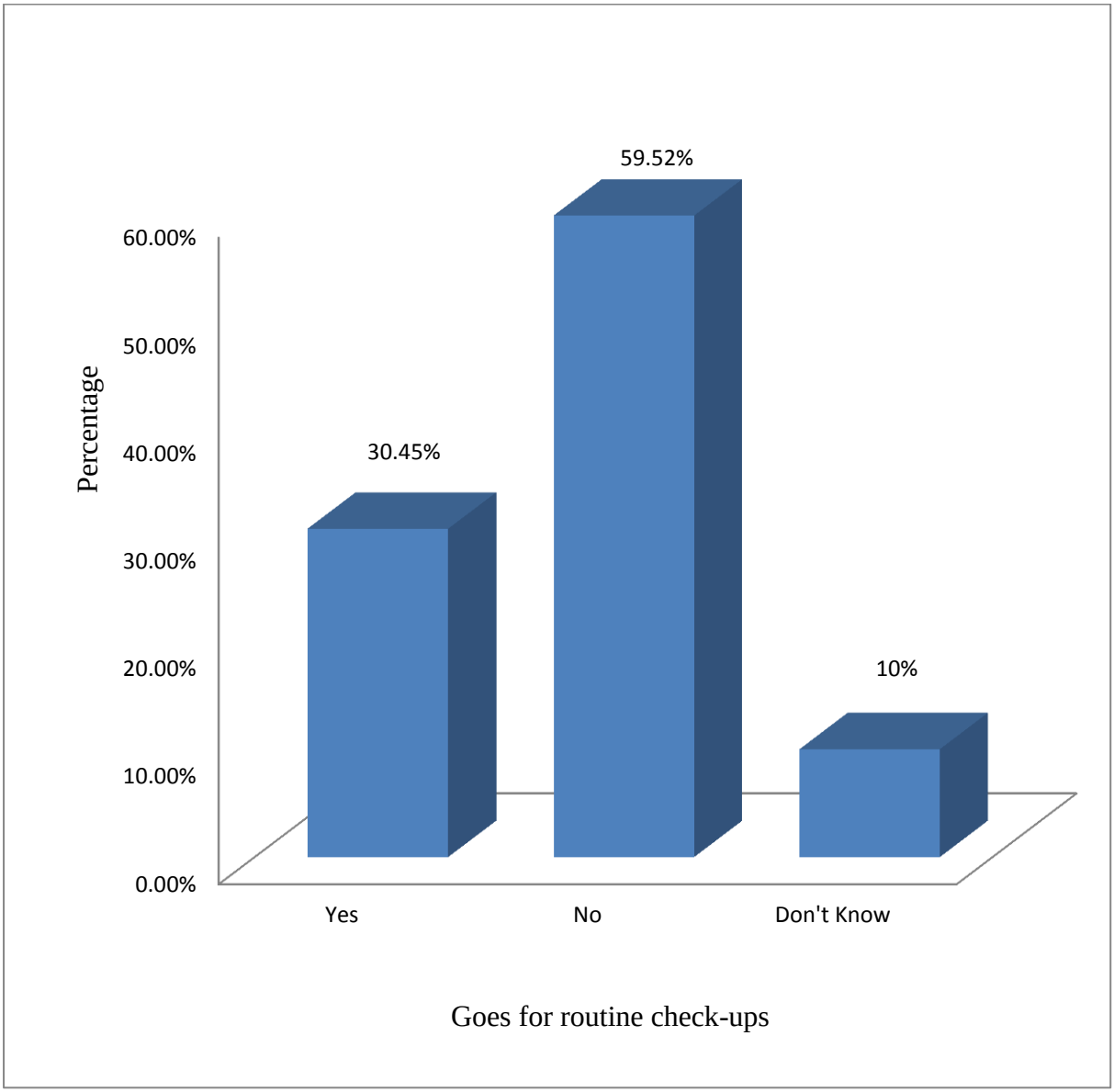


Figure 4.11: Professional routine check-up

From our study, it was shown that, only 37.14% had gone to the doctor or other health professionals for routine check-ups. Most of the patients 56.19% didn't go for routine check-up. And 6.67% patients didn't know about the routine check-up.

4.12 Taking emergency treatment by professional in last 12 months

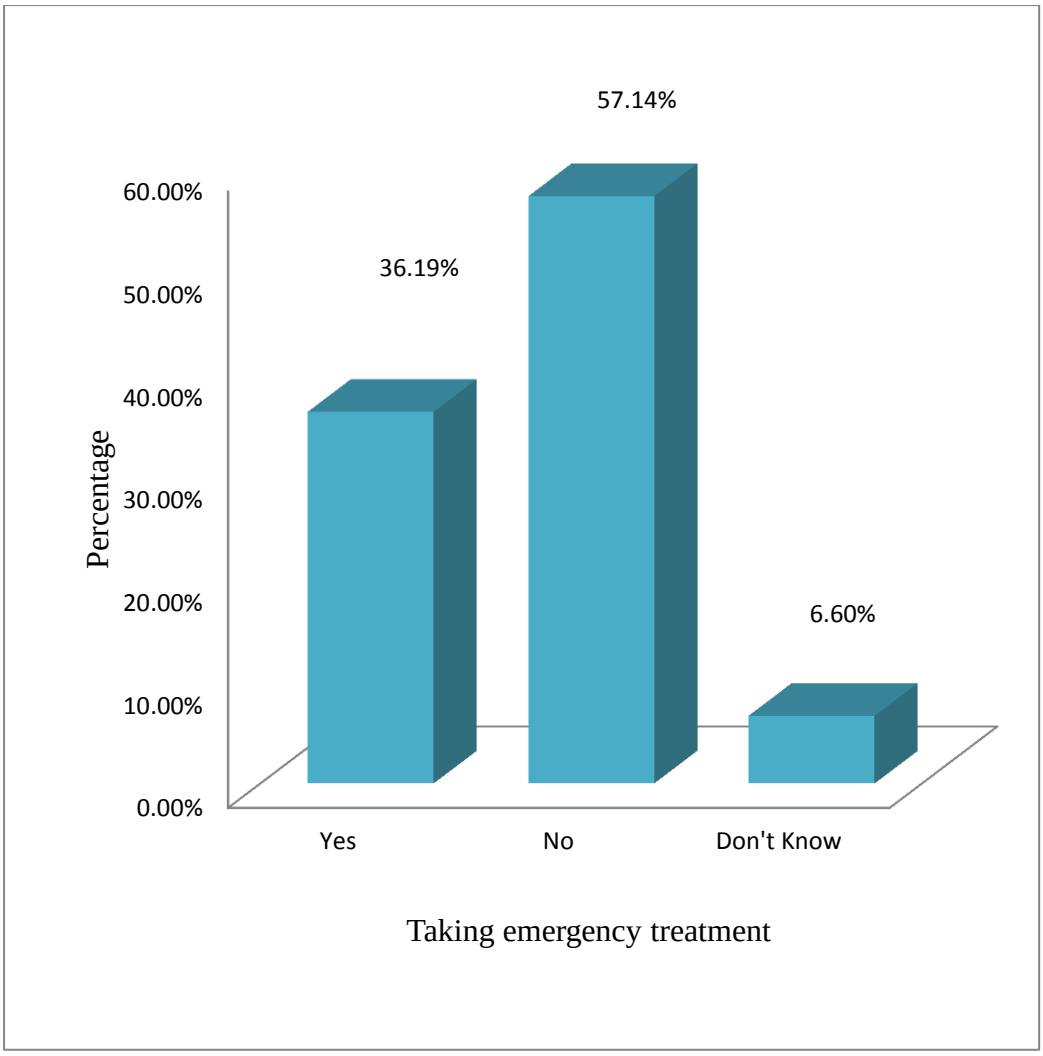


Figure 4.12: Taking emergency treatment by professional in last 12 months

In this study, 36.19% patients had taken the emergency treatment by doctor or other health professionals. And 57.14% patients didn't take any emergency treatment. And 6.60% patients didn't know about an emergency treatment.

4.13 Unable to perform activities due to asthma

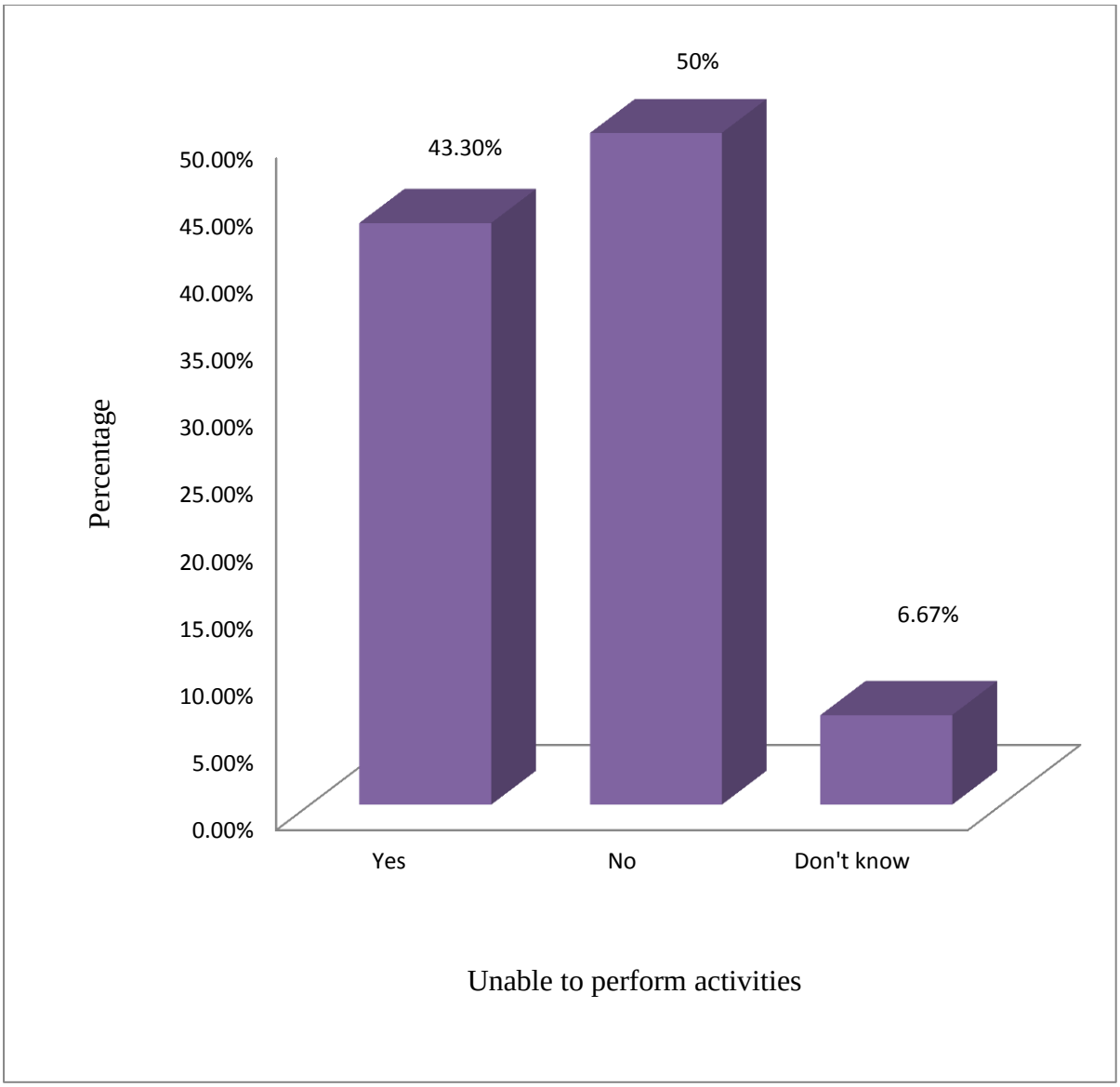


Figure 4.13: Unable to work due to asthma

In our study, about 43.30% patients were unable to work or carry out usual activities because of asthma. 50% patients didn't face any problem. And 6.67% respondents didn't notice this.

4.14 Knowledge given by professional about sign/symptoms

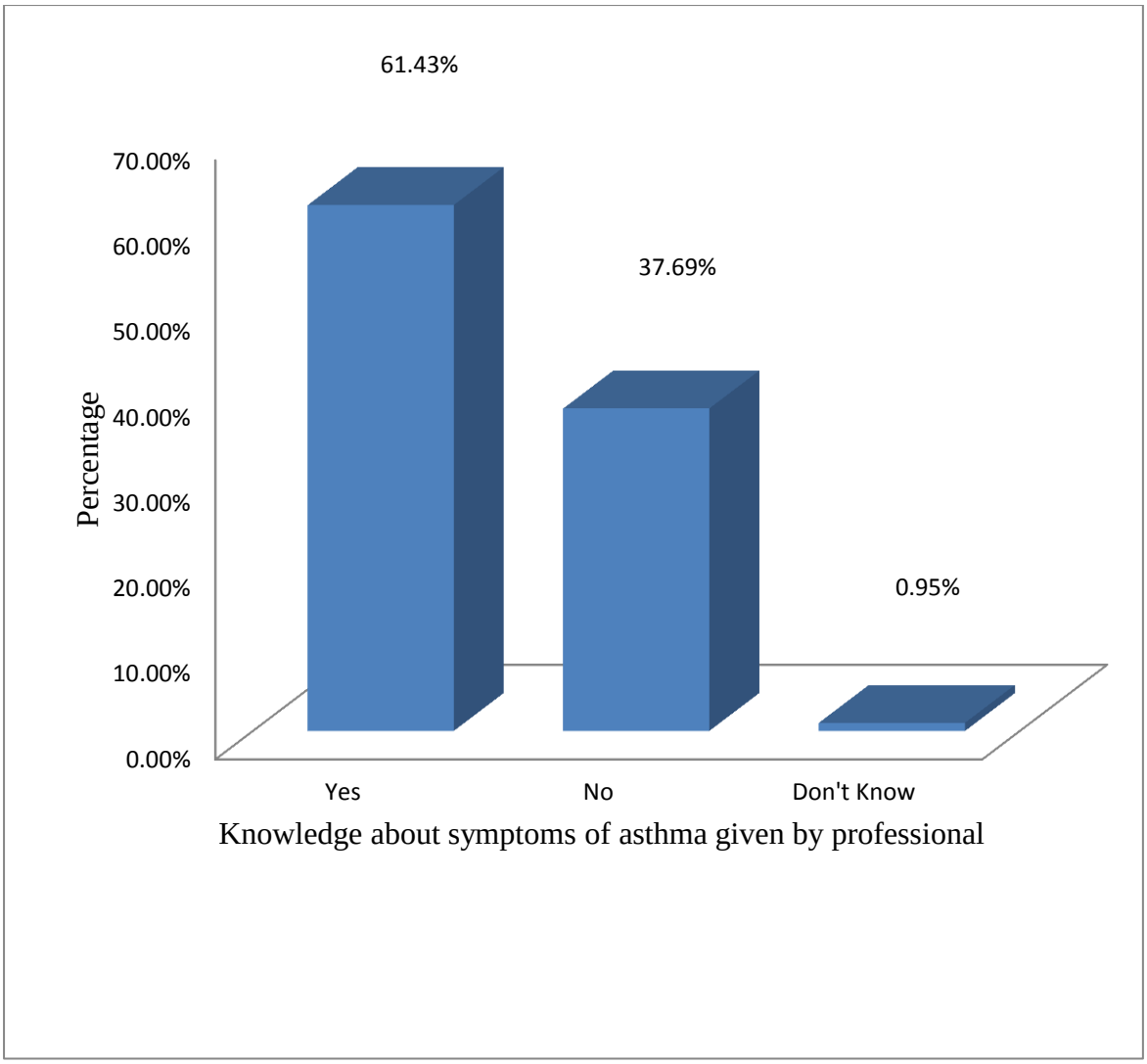


Figure 4.14: Knowledge given by professional about sign/symptoms

It was seen in our project that, if a doctor or other health professionals ever taught the respondents how to recognize early sign and symptoms of an asthma episode. About 61.43% subjects were known by the doctor about this. And 37.69% patient's doctor didn't tell about this.

4.15 Knowledge given by professional about taking action for attack

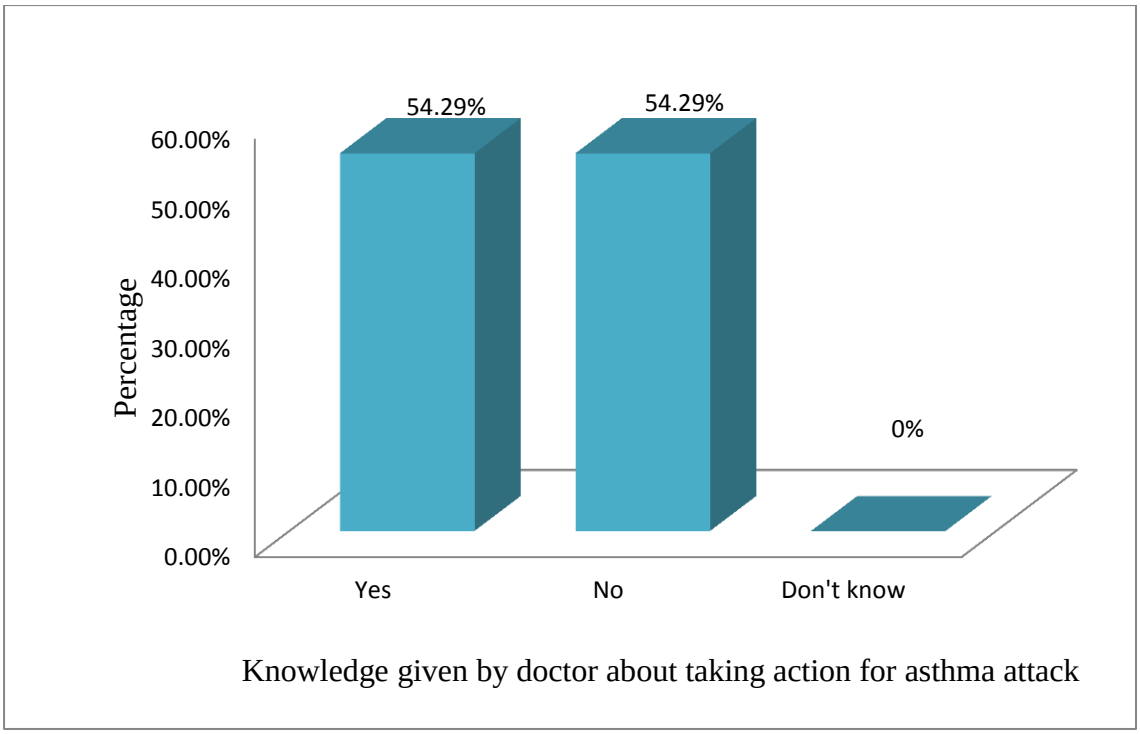


Figure 4.15: Knowledge given by professional about taking action for attack

It was seen in our project that, if a doctor or other health professionals ever taught the respondents what to do during an asthma episode. About 50% respondents were known about this by the doctor. But 50% populations didn't have any idea given by the doctor.
From our survey, we have seen that, a doctor or other health professionals didn't teach or give any knowledge about peak flow meter to adjust daily medications to any person of our population. So, the respondents didn't know about peak flow meter.

Asthma action plan, or asthma management plan, is a form with instructions about when to change the amount or type of medicine, when to call the doctor for advice, when to go to the emergency room. There are no respondent had knowledge given by professional about asthma action plan.

To control from getting worsening asthma episodes a course or class can be taken on how to manage child asthma. There are no respondent had knowledge given by professional about this course or class to manage child asthma.

It was seen in our project that, only a few numbers of patient stop taking asthma medication without physician advice. Most of the patients didn't stop taking medication without physician advice.

4.16 Asthma symptoms can be caused

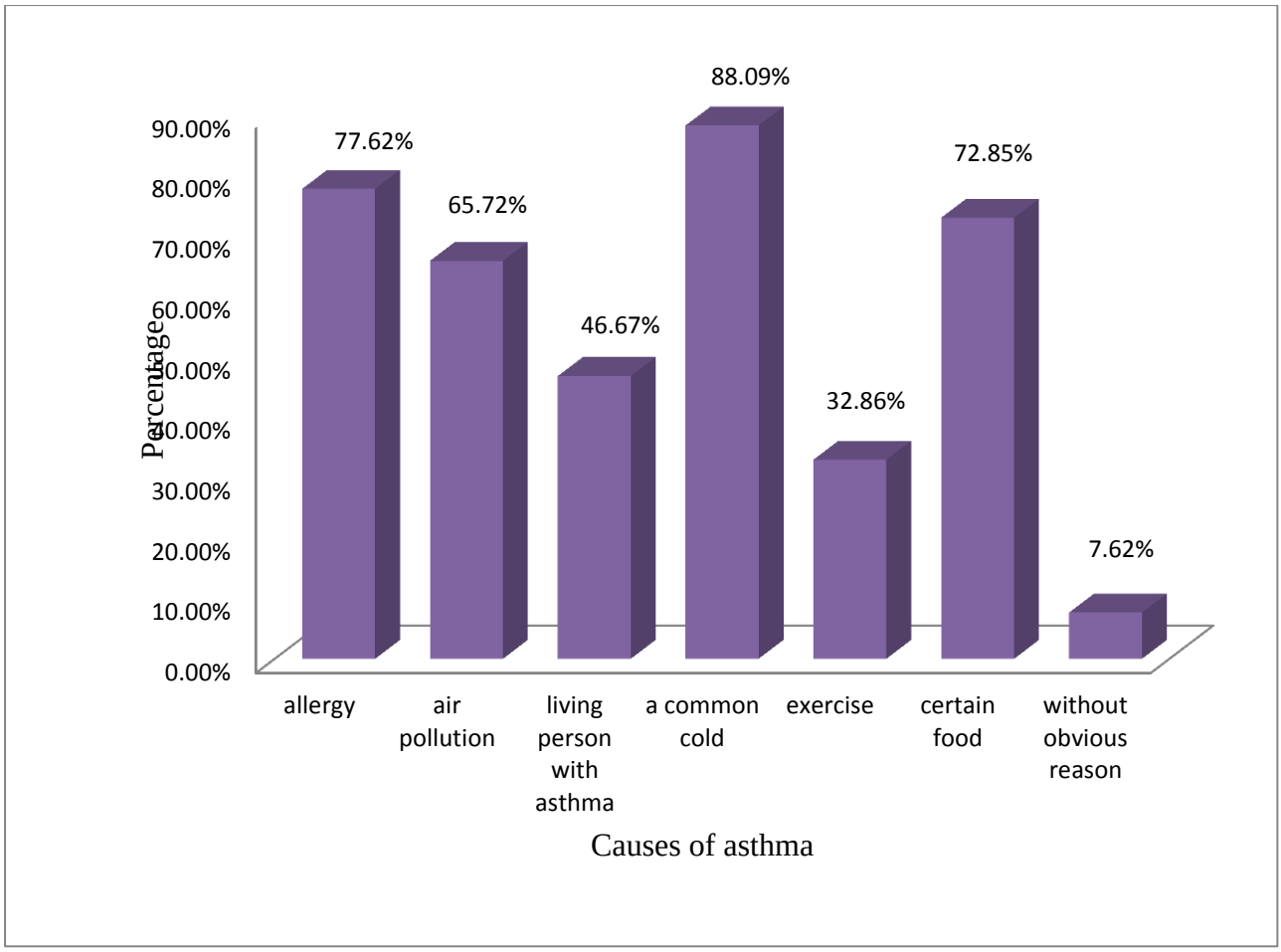


Figure 4.16: Asthma symptoms can be caused

In this study, about 77.62% respondents thought that asthma caused by allergy. Moreover, 65.72% respondents thought that asthma caused by air pollution or any other type of irritant. However, 46.67% populations thought that asthma caused by living with a person who has asthma. And, 88.09% populations thought that their or their child have asthma caused by common cold. Further, 32.86% patients thought that asthma caused by exercise. About 72.85% subjects thought that asthma caused by certain food.

We found that, only 7.62% respondents thought that asthma caused by without obvious reason. And 68.57% populations didn't think that without obvious reason could be a cause of asthma. Most of the respondents didn't thought that their or their child has asthma caused by certain drugs. It may be they don't know the drugs which may increase asthma symptoms of them or their child.

4.17 Regular use of exhaust fan in kitchen

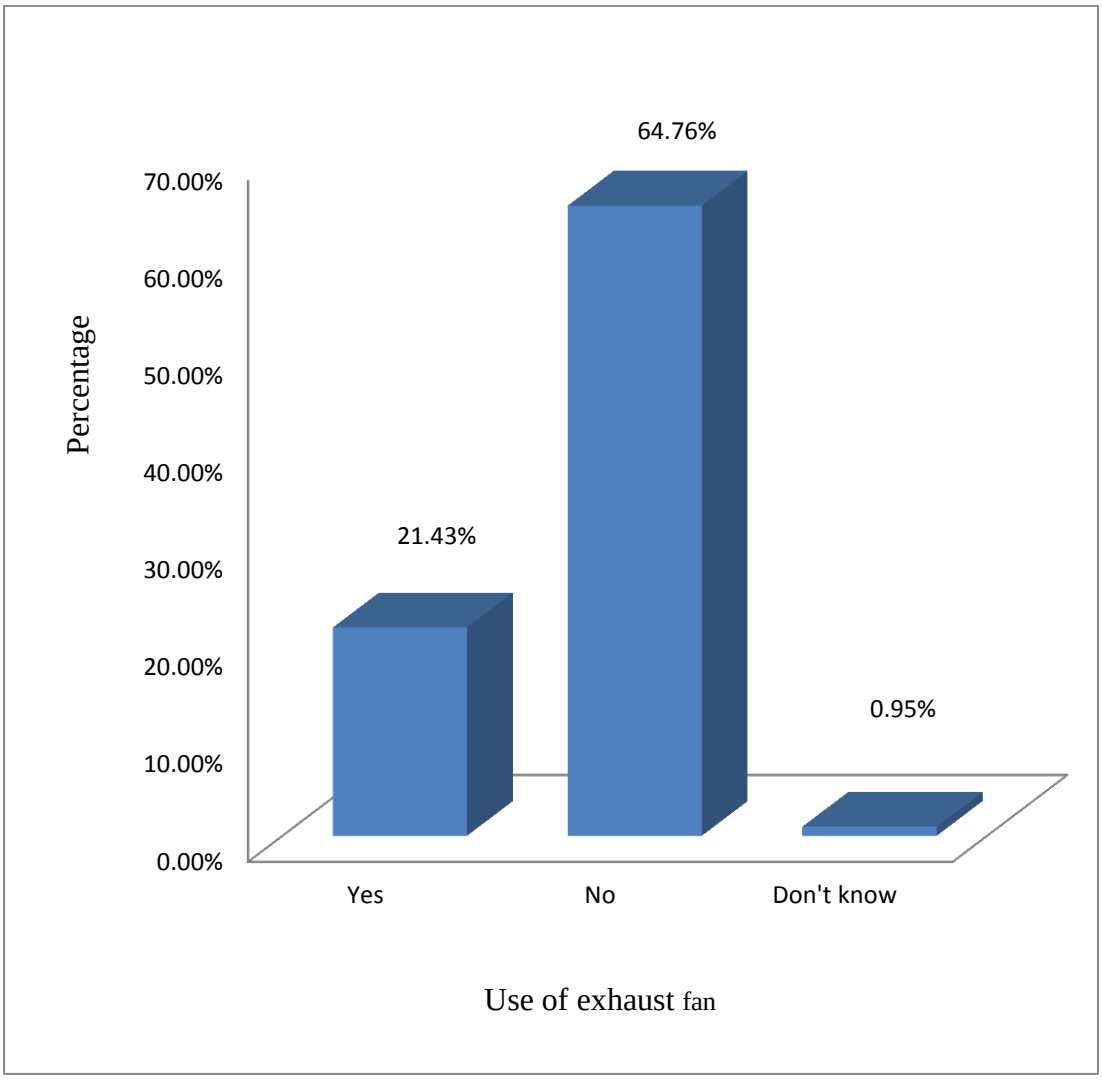


Figure 4.17: Exhaust fan regularly used when cooking in kitchen

In this study, 21.43% respondents had exhaust fan in their home and used regularly when cooking. And 64.76% populations didn't have exhaust fan and so, didn't use when cooking in kitchen which could be a cause of asthma.

4.18 Have pets such as dogs, cats, hamsters, birds or other feathered or furry in home

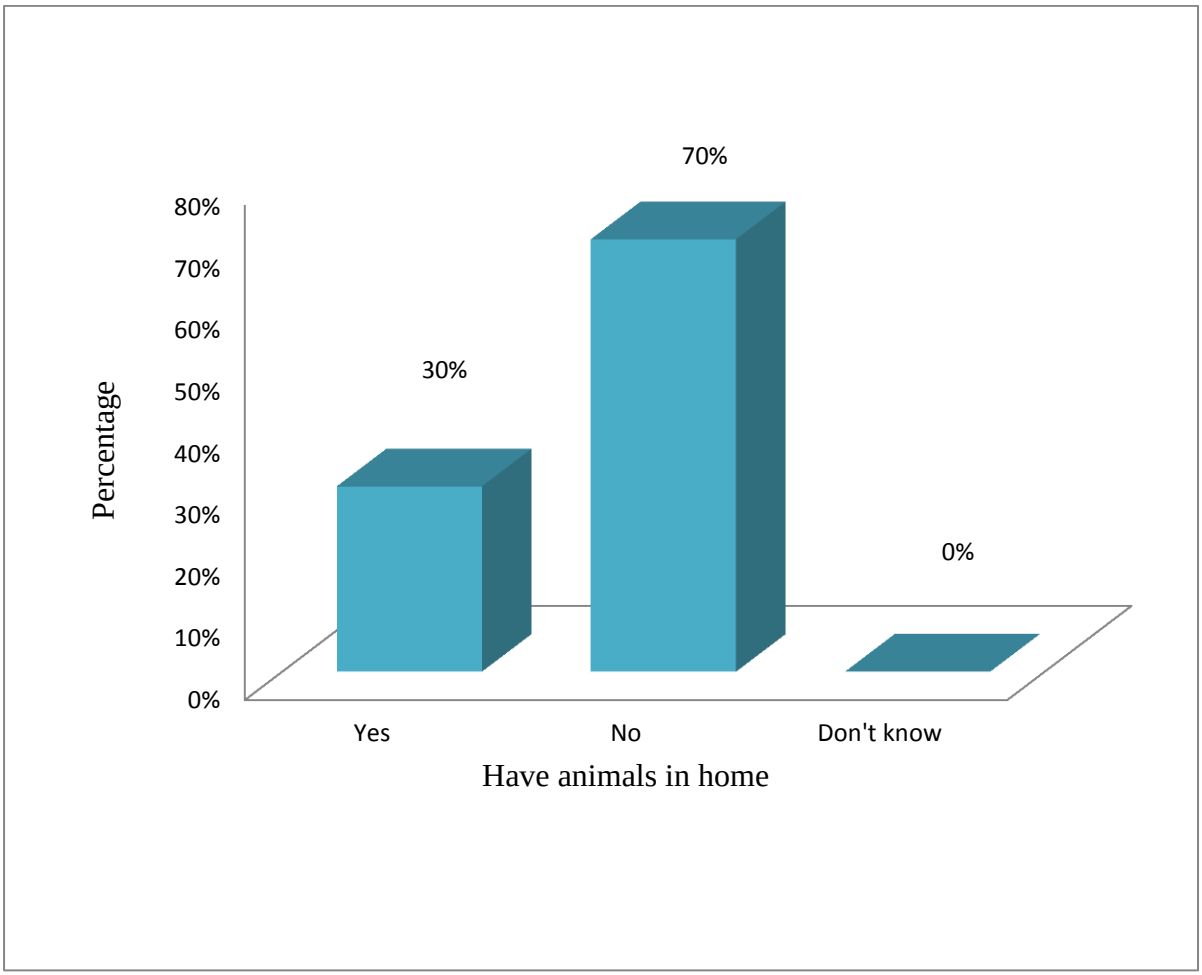


Figure 1.18: Have pets such as dogs, cats, hamsters, birds or other feathered or furry in home.

In this study, 30% patients had pets such as dogs, cats, hamsters, birds or other feathered or furry in home which could be a cause of asthma. And 70% populations didn't have pets such as dogs, cats, hamsters, birds or other feathered or furry in home.

4.19 Wood burning fireplace or wood burning stove used in home

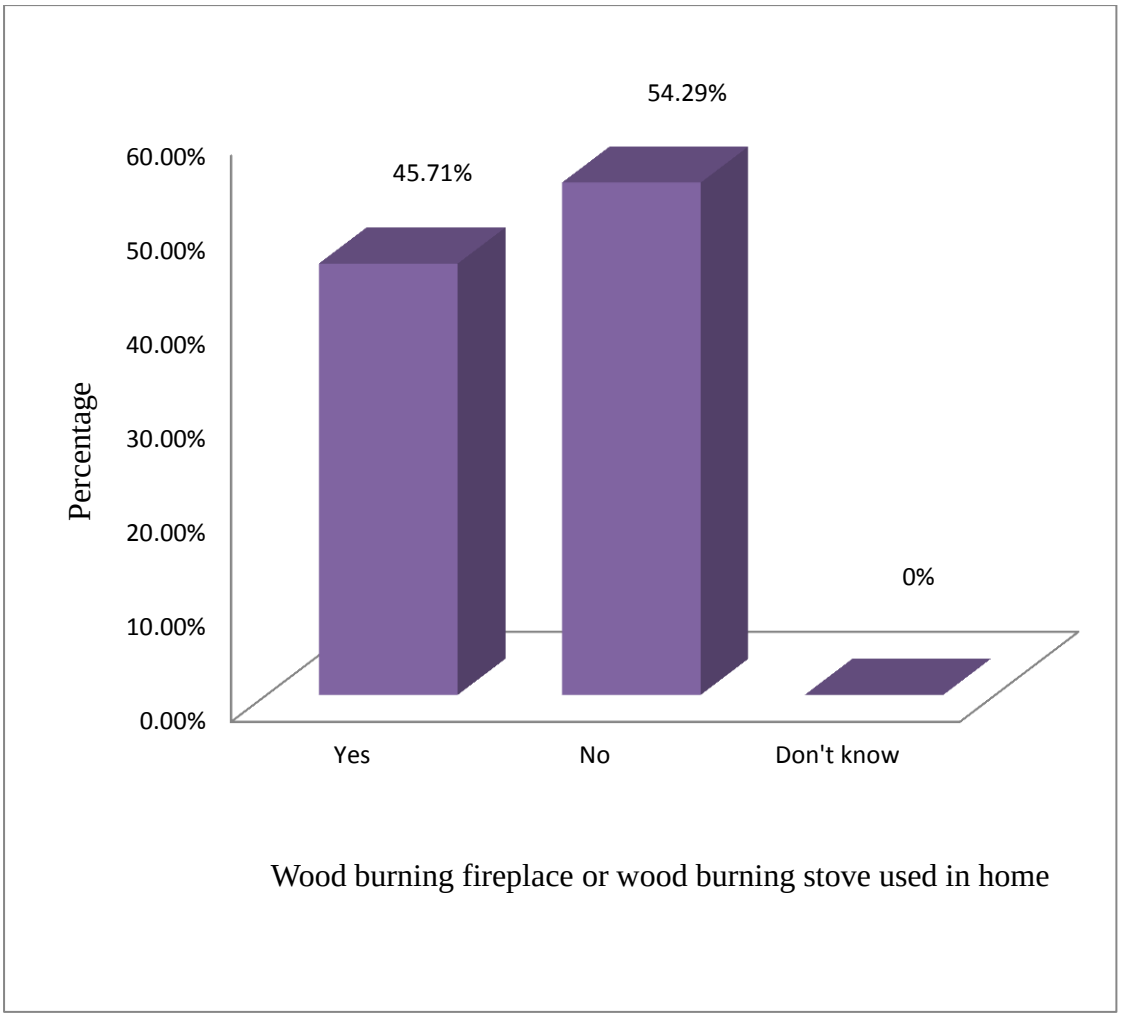


Figure 4.19: Wood burning fireplace or wood burning stove used in home

In this study, 45.71% respondents had wood burning fireplace or wood burning stove used in home. And 70% populations didn’t have wood burning fireplace or wood burning stove used in home.

4.20 Family member who smoke at home

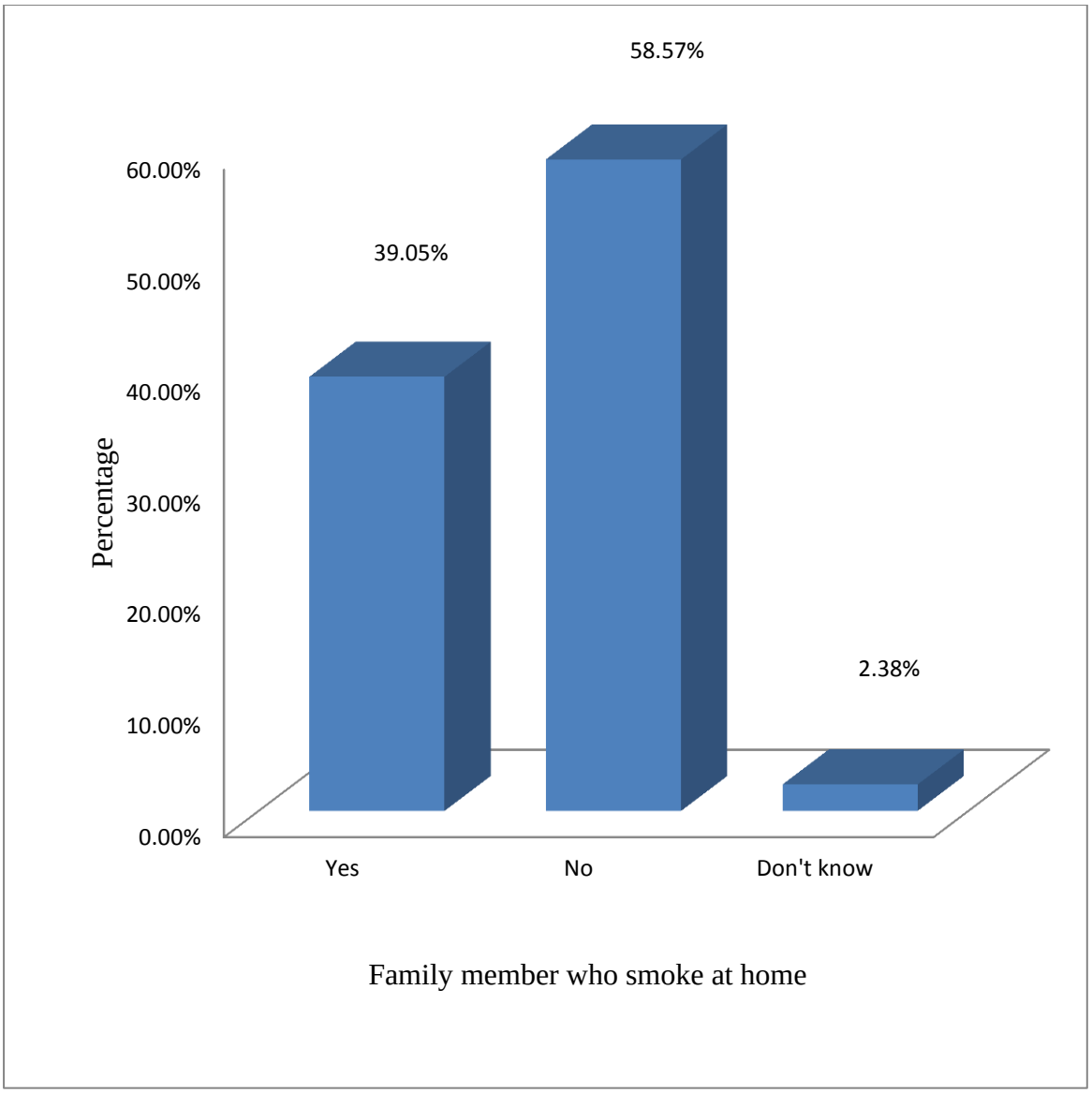


Figure 4.20: Family member who smoke at home

In this study, about 39.05% populations had family members who smoked inside the home. And 58.57% populations didn't have anyone smoked inside home.

4.21 Have carpeting or rugs in bedroom

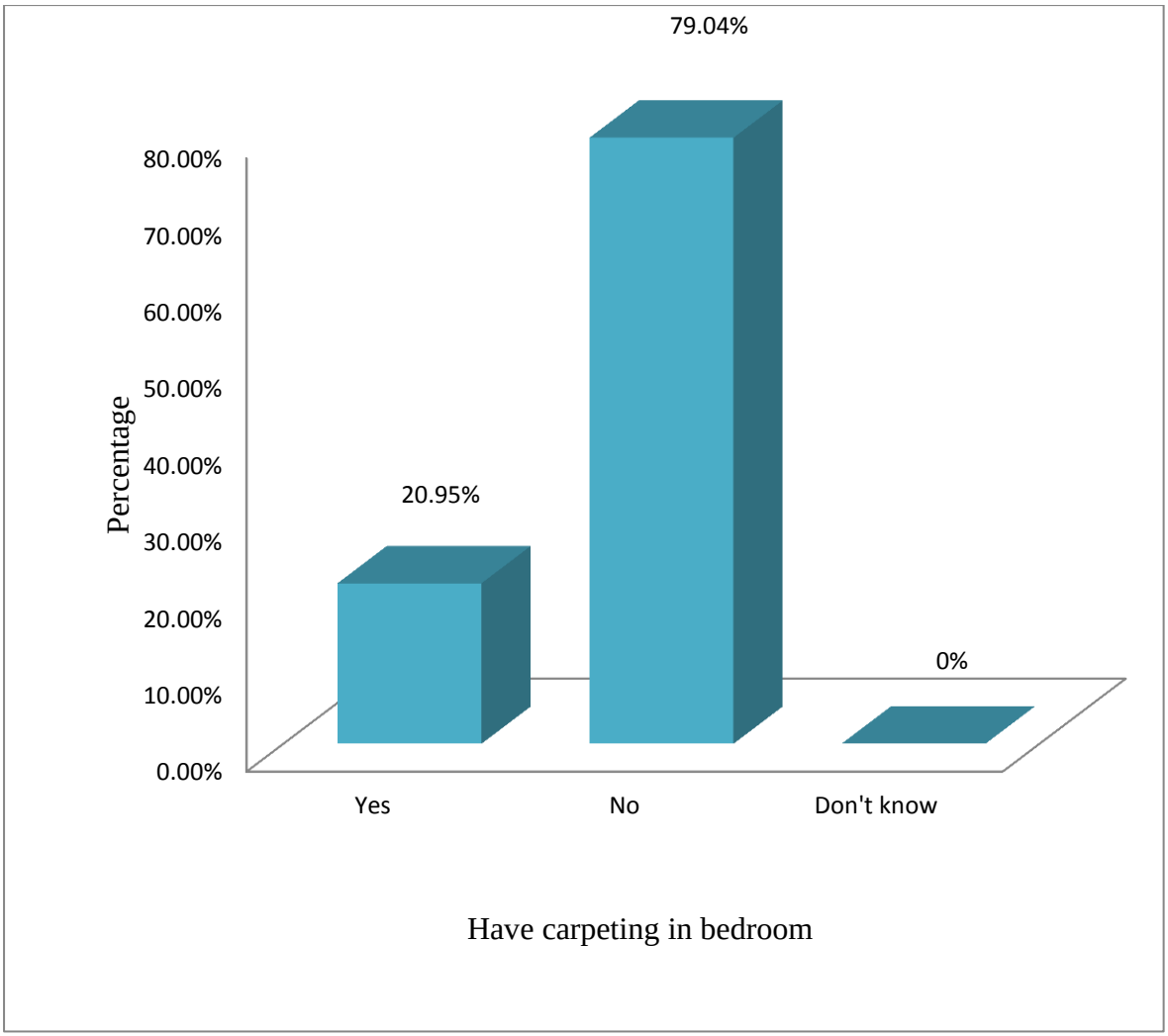


Figure 4.21: Have carpeting or rugs in bedroom

In this study, about 20.95% respondents had carpeting or rugs in bed room which could be a cause of asthma as it may contain dust, allergens or irritant. And 79.04% populations didn't have carpeting or rugs in bedroom.

4.22 Used a prescription inhaler

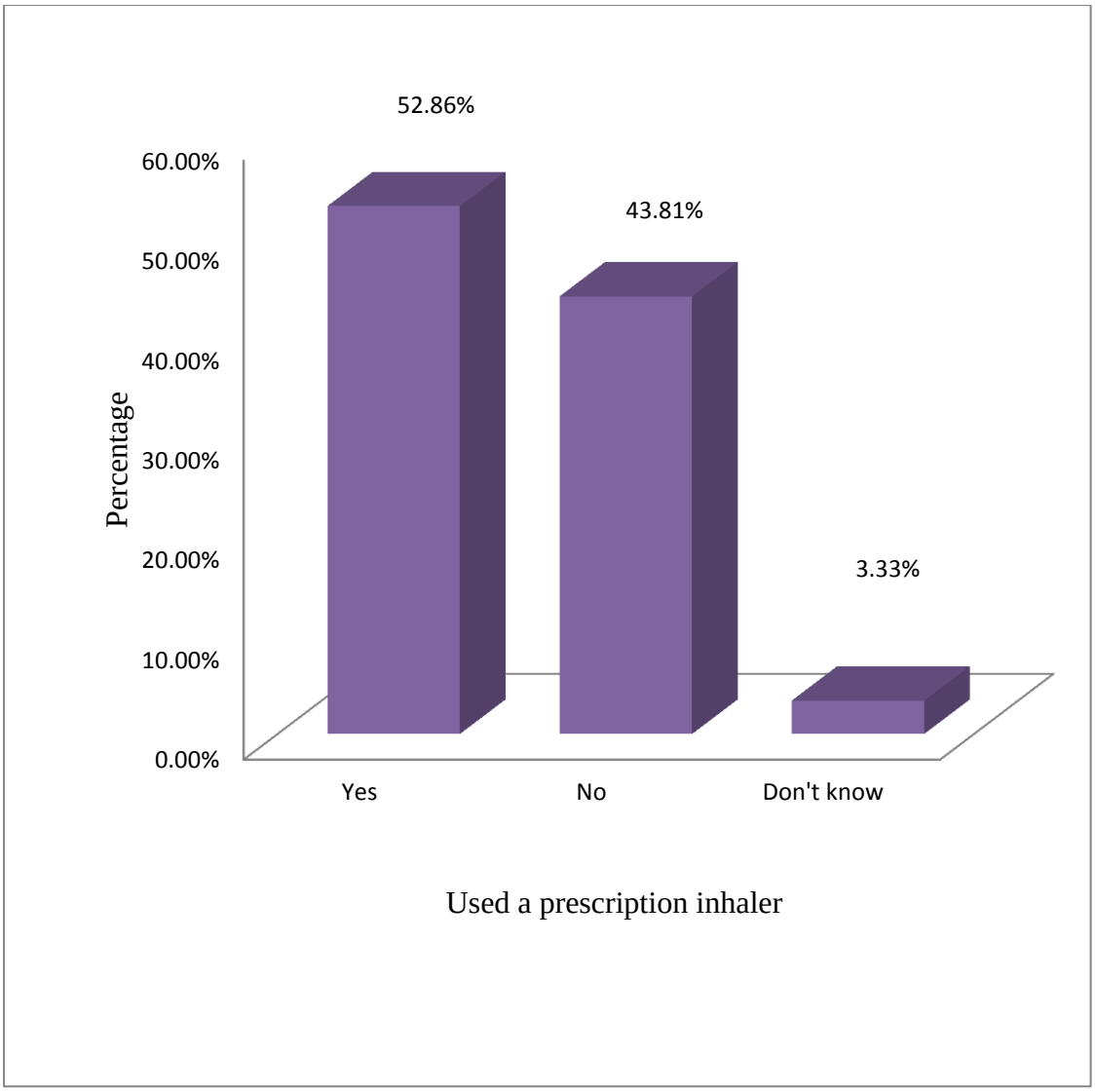


Figure 4.22: Used a prescription inhaler

In this study, 52.86% patients used a prescription inhaler. And 43.81% populations didn't use a prescription inhaler.

4.23 Professional showed how to use the inhaler

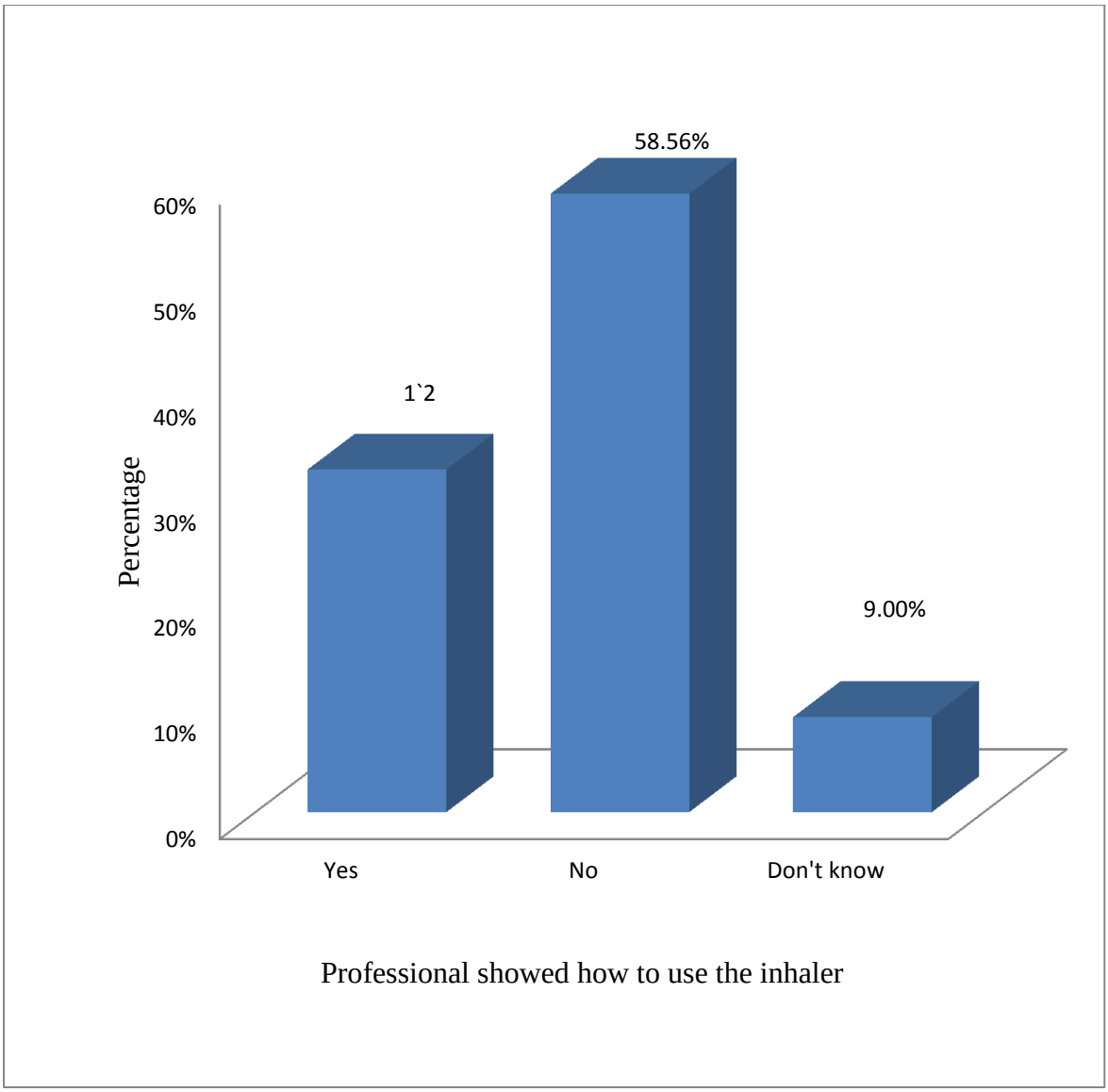


Figure 4.23: Professional showed how to use the inhaler

In this study, 52.86% patients used inhaler. Among them 58.56% subjects conformed that the doctor or other health professional didn't show them how to use the inhaler. Also, 32% subjects conformed that the doctor or other health professional showed them how to use the inhaler. But 9% respondents didn't know whether the doctor said it or not.

4.24 Puffs use in each time

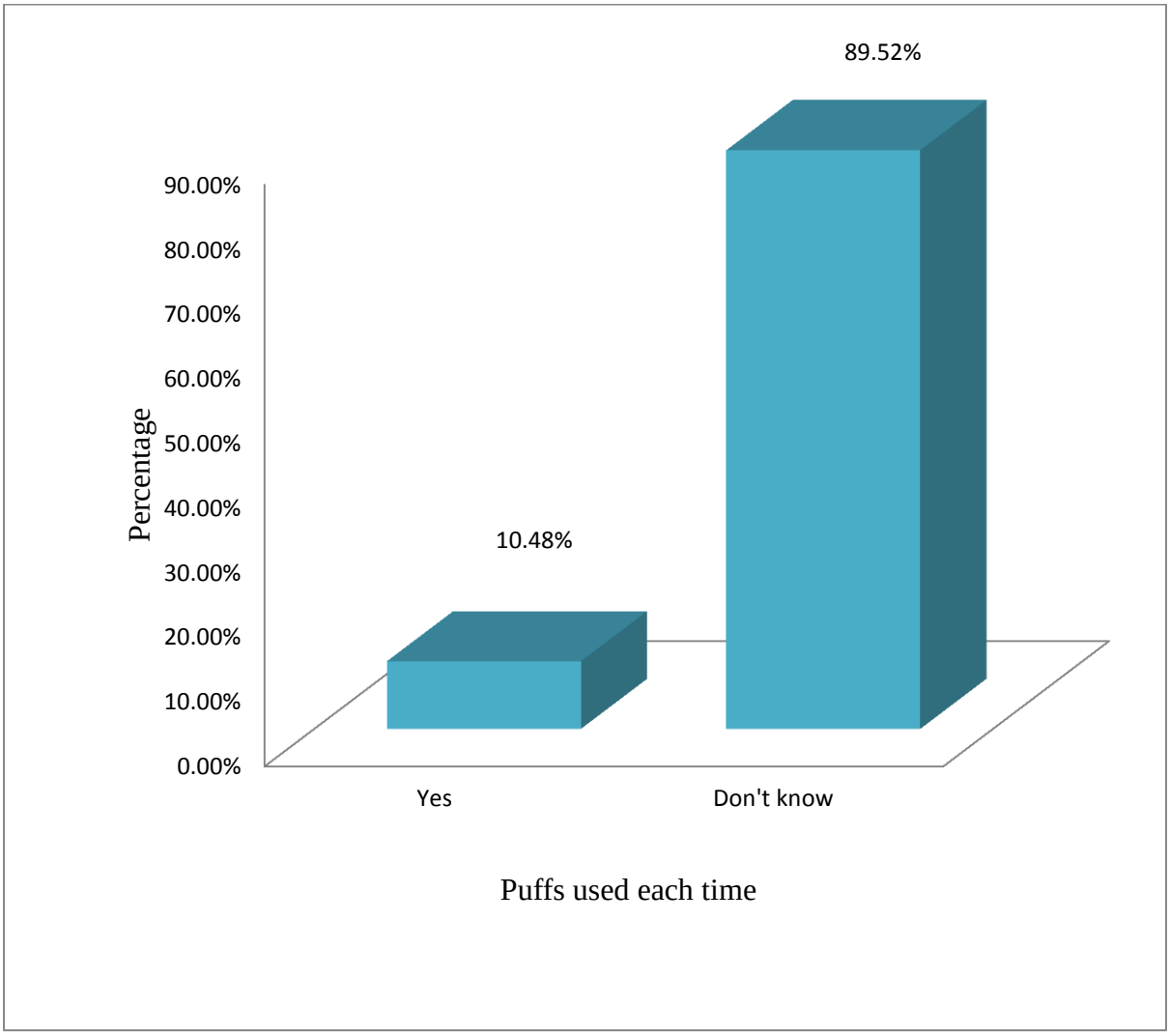


Figure 4.24: Puffs use in each time

In this study, 89.52% populations didn't know the puffs used in each time by inhaler. And 10.48% patients or their parents were known the puffs used in each time by inhaler. For that reason, most of the respondents didn't know about how many puffs they or their child take in each time. They also didn't know how many puffs used on average.

4.25 Taken any prescription asthma medication in syrup form

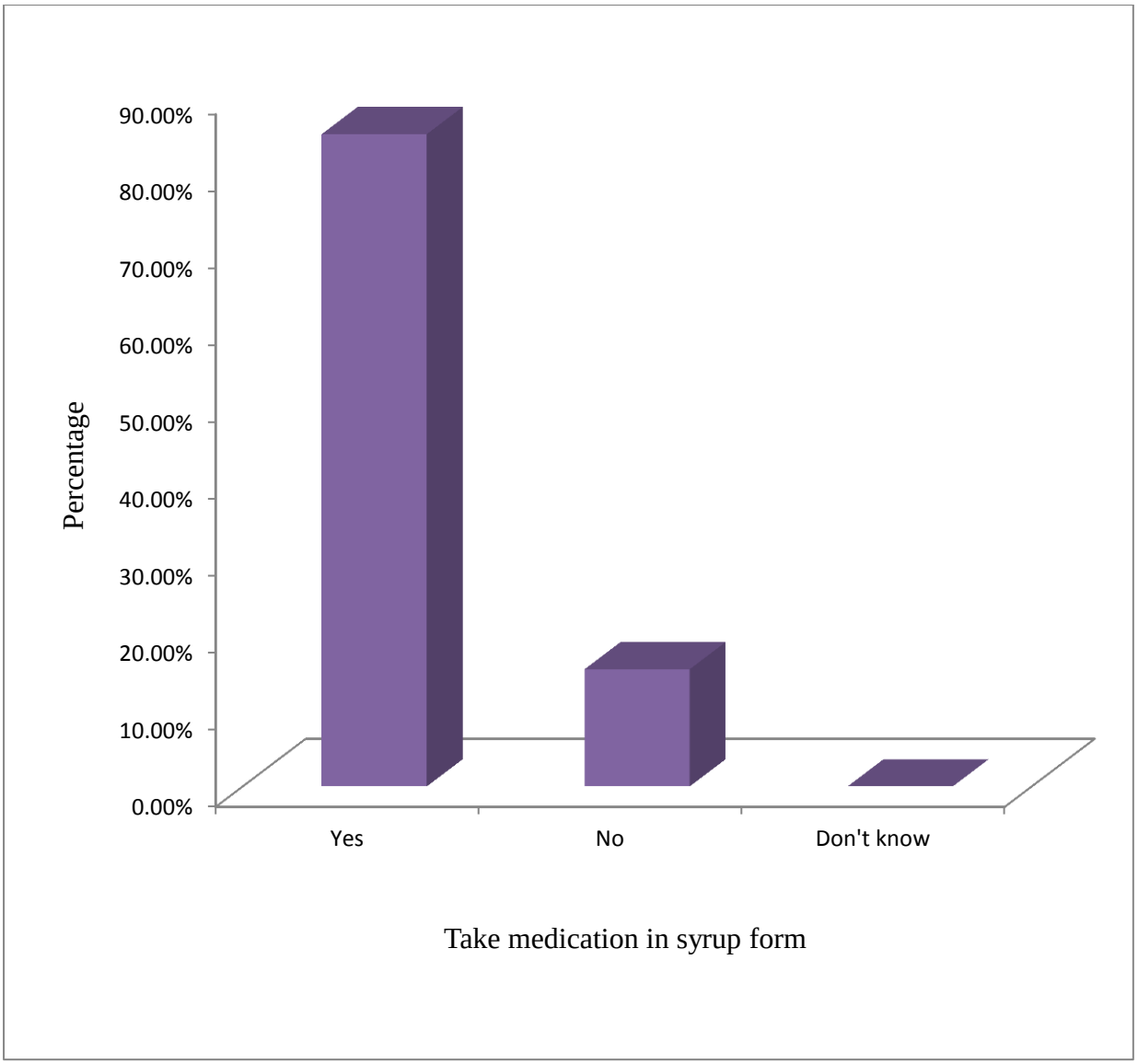


Figure 4.25: Taken any prescription asthma medication in syrup form

It was seen that, in our study population, 84.76% patients took any asthma medicines in syrup form in the last 3 months. And 15.24% patients didn't take any asthma medicines in syrup form in the last 3 months.

4.26 Took any prescription asthma medicines used with a nebulizer

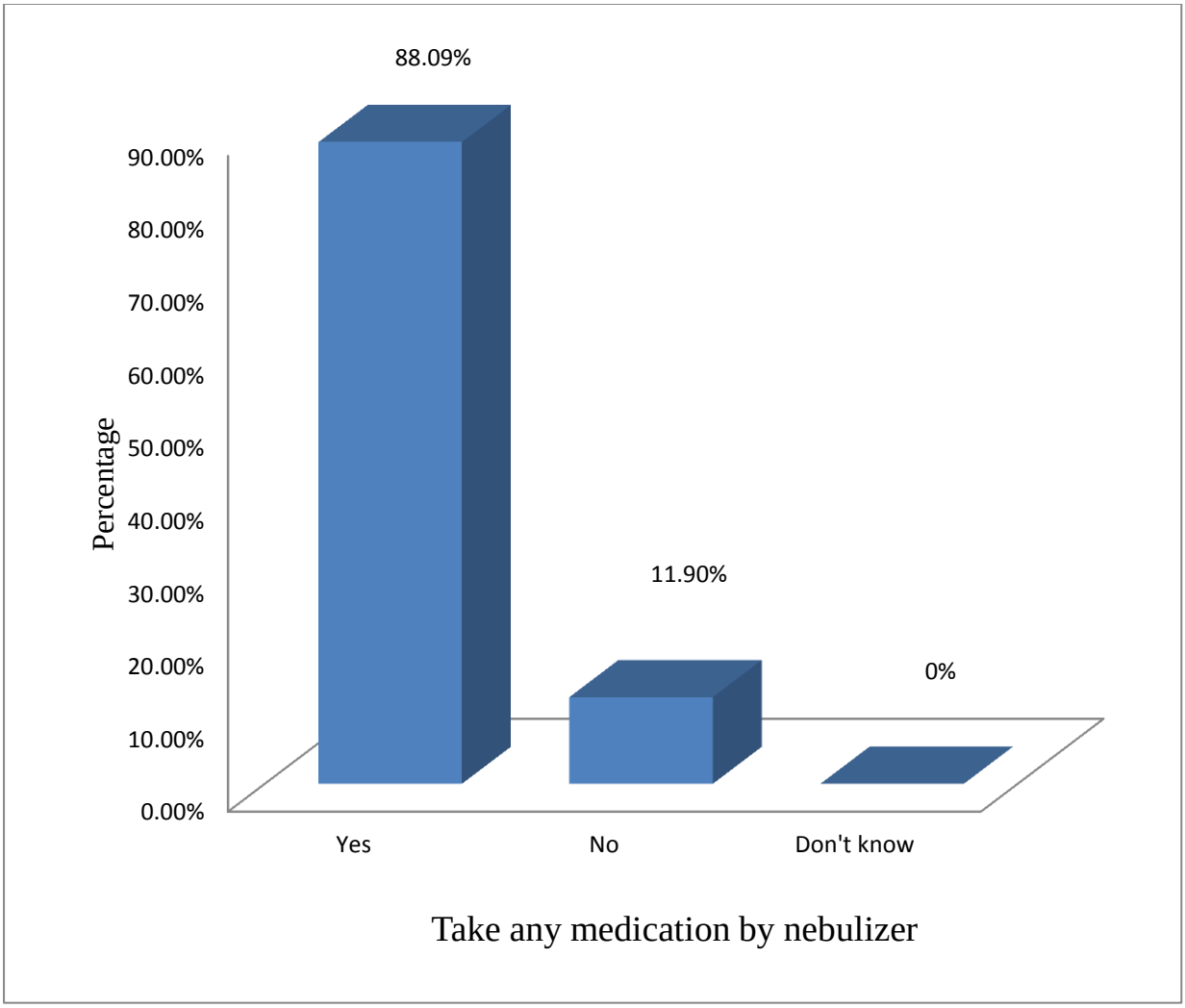


Figure 4.26: Took any prescription asthma medicines used with a nebulizer

It was seen that, in our study population, 88.09% patients took any asthma medicines with a nebulizer within last 3 months. And 11.90% patients didn't take any prescription asthma medicines used with a nebulizer.

4.27 Could not buy medication due to cost

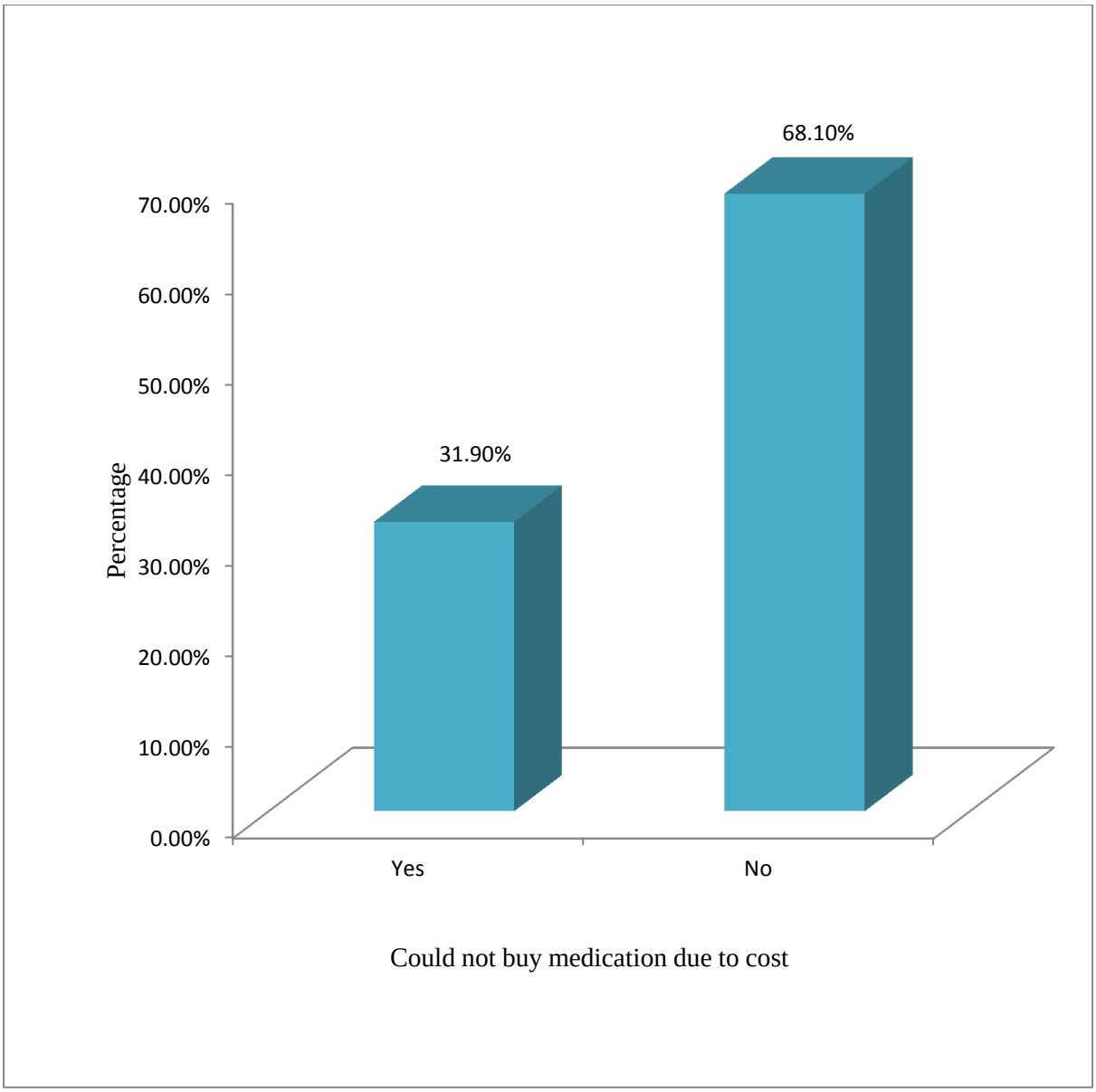


Figure 4.27: Could not buy medication due to cost

It was seen that, in our study population, 31.90% could not buy medication for asthma care due to the cost of medication. And 68.1% patients could buy medication for treatment and asthma care.

4.28 Could not go to specialist due to cost

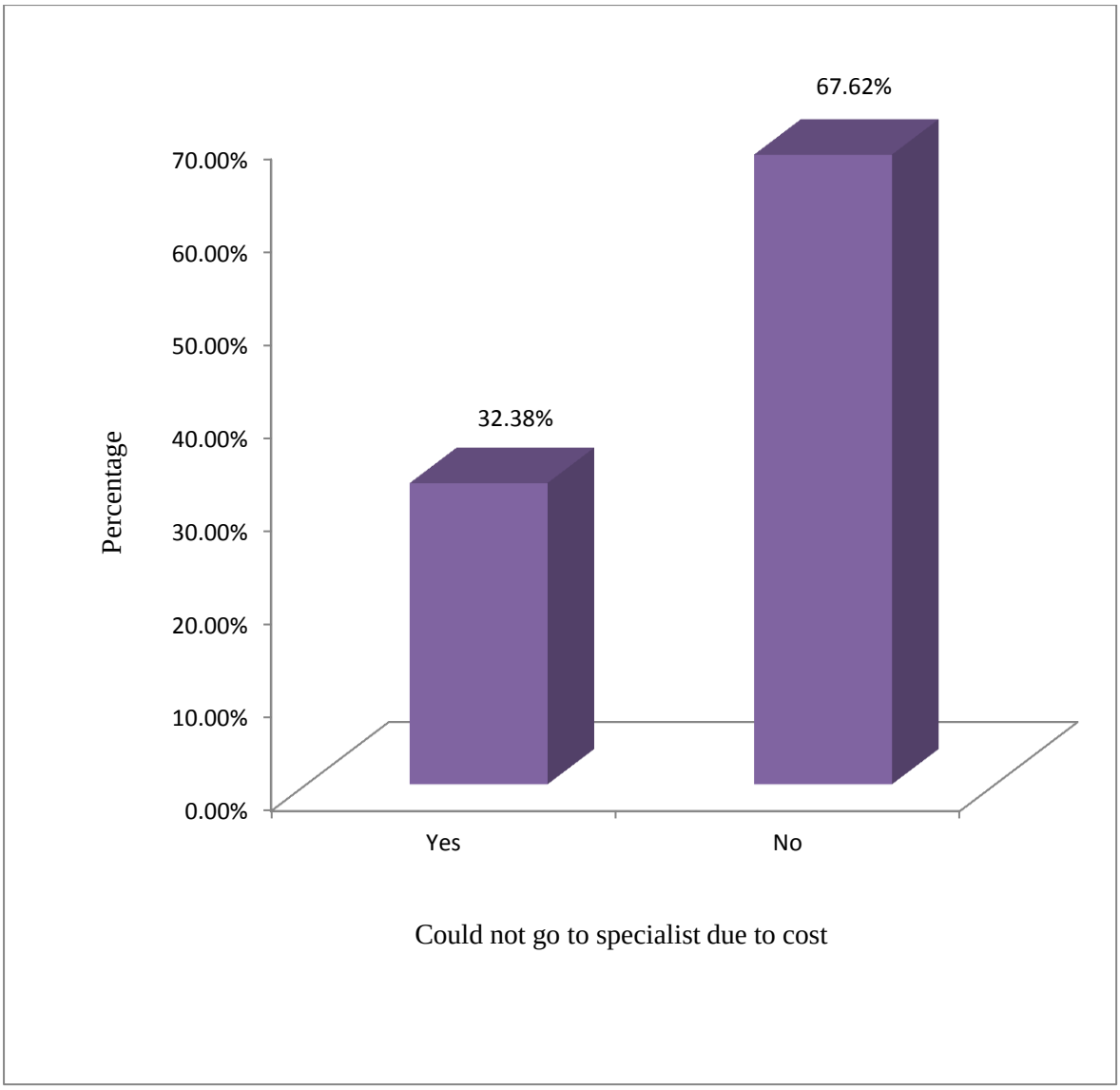


Figure 4.28: Could not go to specialist due to cost

It was seen that, in our study population, 32.38% patients could not go to specialist due of cost as it was expensive also they thought there was no need to go for further check-ups. And 67.62% patients could go to specialist for treatment, and they think it was necessary for child.

4.29 Prescribed Medication

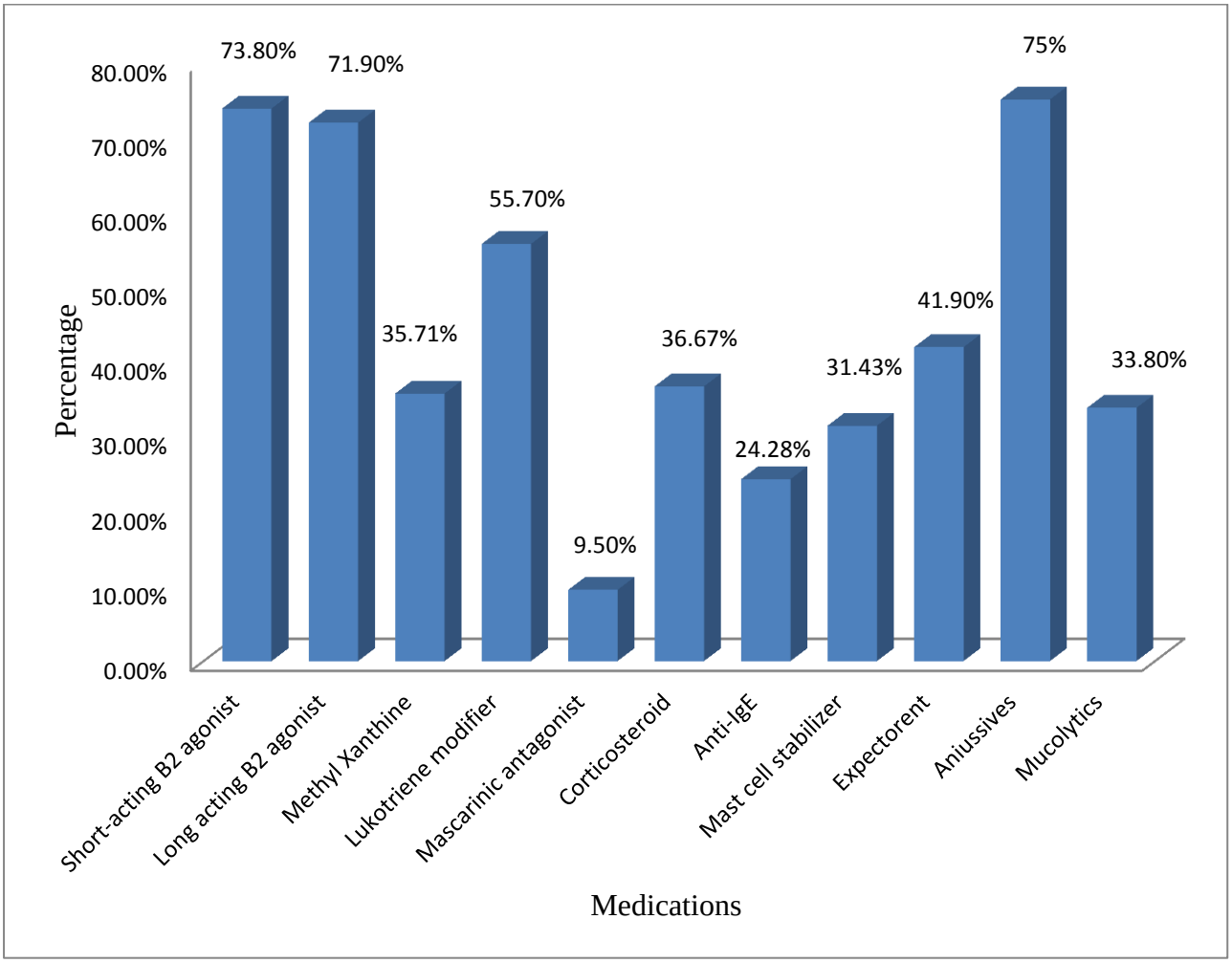


Figure 4.29: Prescribed Medication

It was seen that, the child asthma patients are prescribed by Bronchodilators and anti-inflammatory drugs, anti-leukotriene agents, anti- IgE therapy.

Bronchodilators include short-acting B_2 agonist, long-acting β2 agonist, methyl xanthine, leukotriene modifier, muscarinic antagonist. In this above graph, it was seen that, 73.8%, short-acting B_2 agonist, 71.9% long-acting β2 agonist, 35.7% methyl xanthine, 55.7% leukotriene modifier, 9.5% mascarinic antagonist are prescribed by doctor.

In this above graph, it was seen that, 36.6% corticosteroids, 24.28% anti-IgE, 31.43% mast cell stabilizer, 41.9% expectorant, 75% antitussives, 33% ` are prescribed by doctor.

5. Discussion:

It is essential that asthma becomes an explicit global health priority, alongside and complementary to other non-communicable diseases (NCDs) including chronic obstructive pulmonary disease (COPD), and lung infections such as pneumonia and tuberculosis. Asthma, because it causes such a burden of disease, should be one of the top priorities of governments, development partners and partners in lung health, yet at the present time it has little profile with them. We must accelerate our efforts to overcome the operational bottlenecks that are preventing patients from receiving care in low-income settings. Implementing standard case management, strengthening health systems at all levels, starting from the community level, and using appropriate technologies efficiently are the way to go (The Global Asthma Report, 2014).

We performed our study on 210 child asthma patient. All the patients in this survey had asthma which was confirmed by doctor or other health professional. And all the patients still have asthma in our survey population. The patients or their parents are known that they have asthma.

From the result of ISAAC's ground-breaking survey of a representative sample of 798,685 children aged 13-14 years in 233 centres in 97 countries, that the burden of asthma is greatest for children aged 10-14. Asthma is the 14th most important disorder in the world in terms of the extent and duration of disability. The burden of asthma, measured by disability and premature death, is greatest in children approaching adolescence (ages 10-14) (The Global Asthma Report, 2014).

Whereas, in our study, burden of asthma is greatest for children aged 6-10 years. Then, the most affected child age range was 11-15 years.

According to childhood asthma guidelines, parent training to improve their asthma-related knowledge, altitudes and practices should be included in routine clinical care. A study was performed by Jing Zhao in 2012 to see the knowledge, attitudes and practices of parents of children with asthma in 29 cities of China which is a multi-centre study. The response rate was 83.95% (2485/2960). Only 18.31% (455/2485) of subjects were answered ≥ 60% of the knowledge questions (Zhao J. *et al*., 2012).

In contrast, in our study, 95% patient of our survey population responds and answered all questions quite properly. All the patients or their parents had primary knowledge about asthma.

A study was performed by Luisa Baros *et al* (2015) about the Asthma knowledge, subjective assessment of severity and symptom perception in parents of children with asthma. About 50 children with asthma and their caregiver participated in the study. All children had been diagnosed with asthma for 4-6 months, and 76% for 4-5 years. Children had attended the present outpatient service for a period of 1 month to 11 years, only 44.9% reported a level of symptoms in accordance with the level of control assessed by the clinician, and under-evaluation of symptoms was the most common error in parents' reports of 36.7% parents (Baros L. *et al*., 2015).

In our study, most of the patient's (79.53%) last experience of asthma symptoms occurred within less than 1 day to 3 months ago. So, most of the patients or their parents (97%) consulted with doctor or other health professional about asthma. As, 97% patients symptoms arising and consulted with the doctor within less than 1 day to 3 months ago, so their medication consumption rate increased on the same period.

In the Luisa Baros *et al* (2015), based on the asthma symptoms reported by parents, most children had either intermittent (46%) or mild persistent asthma (40%). Twenty-six percent of parents evaluated child's asthma severity in the subjective scale as nothing serious, 18% as somewhat serious, 40% as more or less serious and the other 16% as quite serious. Clinicians' assessments classified 38% of children as having a controlled asthma (Baros L. *et al*., 2015).

From our study we found that, 42.85% patients had mild intermittent and 31.9% patients had mild persistent. Moreover, 14.76% patients had moderate persistent or they had attack of wheezing daily. About 7.14% patients had severe persistent or they had attack of wheezing continual. In our study, mild intermittent and mild persistent patients were more than the moderate and severe persistent.

A survey on assessment of Parental Knowledge of Paediatric Asthma Triggers by scientist Binh showed that, 33% of 82 children had asthma symptoms usually in winter, 28% in fall, and 20.7% in spring and 18.3% in summer season (Vu B., 2013).

It was seen in our study that, among patients the most seasonal influence of asthma symptoms were in winter (53.80%) and summer season (32.87%). In fall and spring season these population were less affected.

In the statistics of asthma Australia, the majority of children with asthma in Australia had infrequent intermittent asthma, which means they had occasional 'episodes' of asthma symptoms lasting a short period of time, and only took medication when they had symptoms rather than every day (Asthma Australia, 2015). Whereas, in our study, about 68.57% patients had asthma episodes within the 30 days.

A study was performed by researcher Garrison to determine the effect of asthma controller medication use, choice, and adherence on sleep in children with asthma. The analysis included 482 children; about 82.6% and 75.9% completed the 6-month and 1-year follow-up visits, respectively. Sleep problems were common, with 19.4% of parents at baseline reporting frequent problems with the child falling asleep and 12.1% reporting frequent daytime sleepiness (Garrison.M.M., 2011).Whereas, in our study, half of population 51% patients faced difficulty to stay asleep because of asthma.

From the National asthma survey-New York state summery report, 2002-2003, among children with asthma, 28.8% patients had no asthma routine visits in the past 12 months; 36.3% patients had 1–2 asthma routine visits in the past 12 months; 23.5%patients had 3–6 asthma routine visits in the past 12 months; and 11.4% patients had seven or more asthma routine visits in the past 12 months (Public Health Information Group, 2015). Whereas, it was seen in our study that, only 37.14% patients had gone to the doctor or other health professionals for routine check-ups. Most of the patients 56.19% patients didn't go for routine check-up. And 6.67% patients didn't know about the routine check-up which is very important to manage asthma.

A study was performed by Capital Institute of Paediatrics, Beijing, China, in 2012 to see the Status of asthma control in children and the effect of parents' knowledge, attitude, and practice in China, a multi-centre study. A total of 2,960 parents with children with asthma who visited those hospitals were selected for the knowledge, in the past 12 months, 66.0% of children with asthma had asthma attacks, 26.8% visited an emergency room, and 16.2% were hospitalized (Zhao J. *et al.,* 2012).

Whereas, in our study, it was seen that, in the past 12 months, 97% of children with asthma had asthma attacks, 36.19% patients visited an emergency room, and were hospitalized.

A study done by county of Los Angeles public health in' breathing easy?' Child asthma in Los Angeles County showed that 40.9% of children with asthma had their physical activity limited due to their asthma (Fielding J. *et al*., 2014).

However, in our study, 43.30% patients were unable to work or carry out usual activities because of asthma. About 50% patients didn't face any problem. And 6.67% patient or their parents didn't notice this issue.

Among children with asthma, 84.3% patients/parents were taught by a doctor or other healthcare professional what to do during an asthma attack. Among children with asthma, 42.3% were given an asthma management plan (Public Health Information Group, 2015). And it was seen in our project that, if a doctor or other health professionals ever taught the patients or their parents how to recognize early sign and symptoms of an asthma episode. About 61.43% patients or their parents were known by the doctor about this. And 37.69% patient's doctor didn't tell about this.

A survey on assessment of Parental Knowledge of Paediatric Asthma Triggers by researcher Binh showed that that, 22% of 82 patients have asthma symptoms caused by air pollution or any other type of irritant like dust or fumes. About 19.5% patients have asthma symptoms caused by common cold and 13.41% patients thought that asthma symptoms caused by exercise (Vu B., 2013).

Whereas, in our study, 65.72 % patients or their parents thought that their or their child have asthma caused by air pollution or any other type of irritant. About 88.09% patients or their parents thought that their or their child has asthma caused by common cold and 32.86% patients or their parents thought that their or their child have asthma caused by exercise.

A study was performed by Ang, K.L. *et al* (2001), to see the Childhood Asthma and Dietary Management among Singapore Parents. A total of 4352 returns were obtained of which a total of 2067 asthmatic children were identified based on the criteria for diagnosis of asthma in the International Study of Asthma and Allergies in Childhood. The findings found that 56% percent of parents reported that foods and drinks were the triggers of their children's asthma attacks (Ang.K.L. & Foo, S., 2001). Whereas, in our study, it was seen that, 77.62 % patients or their parents thought that their or their child have asthma caused by foods and drinks.

A survey was done by Zaraket *et al* (2011), on parenteral perception and believe about childhood asthma in 2011 stated that around 54% of parents believed that asthma was

hereditary or living with a person has asthma (Zaraket *et.al*, 2011). Moreover, in our study, 46.67% patients or their parents thought that their or their child has asthma caused by living with a person who has asthma. And 51.43 % populations didn't think that living with a person who has asthma could be a cause of asthma.

A survey on assessment of Parental Knowledge of Paediatric Asthma Triggers by Binh Q. Vu, it was seen that 40.20% patients had air cleaner or purifier inside the home (Vu B., 2013). And in our study, most of the patients or their parents didn't know about air cleaner or air purifier.

A survey was done on assessment of Parental Knowledge of Paediatric Asthma Triggers by Binh Q. Vu, it was seen that there is a wood burning fireplace or wood burning stove used in home (Vu B., 2013). Whereas, in our study, 45.71% patients had wood burning fireplace or wood burning stove used in home which could be a cause of asthma. And 70% populations didn't have wood burning fireplace or wood burning stove used in home.
A survey project done by Maquire on medicines in liquid and syrup form used long-term in paediatrics: a survey in the Northern Region of England. The medication regimens of 243 children aged 1-16 years were analysed. The children were taking medication orally in liquid or syrup form for chronic disease. About 39% of the children were took any prescription asthma medicines in syrup form and 44% didn't take any prescription asthma medicines in syrup form (Maquire A. *et al.*, 1994). Whereas, it was seen in our study population that, 84.76% patients took any prescription asthma medicines in syrup form. And 15.24% patients didn't take any prescription asthma medicines in syrup form.

A survey done by Santos *et al.* (2012), on Pattern of asthma medication use among children from a large urban centre in Brazil. This study describes the use of asthma medications among children in the general population and in children with current asthma, living in a large urban centre in Brazil. In all studied children (n = 1,382) aged 4–11 years, oral β_2-agonists were the drugs most frequently used (9.8%), followed by short-acting inhaled β_2-agonists (4.3%) and systemic corticosteroids (1.6%). A total of 312 children only 22.6% reported current asthma, and 62% of them were not being treated with any anti-asthmatic drugs. Of all those who reported following a certain type of treatment, 20% used oral beta$_2$-agonists alone; 6.1% short-acting inhaled β2-agonists alone (Santos. *et. al.*, 2012).

In our survey, it was seen that, 73.8%, short-acting β_2 agonist, 71.9% long-acting β_2 agonist, 35.7% methyl xanthine, 55.7%leukotriene modifier, 9.5% mascarinic antagonist were prescribed by doctor. Also, 36.6% corticosteroids, 24.28% anti-IgE, 31.43% mast cell stabilizer, 41.9% expectorant, 75% antitussives, 33% mucolytics are prescribed by doctor.

A survey done by Department of Paediatrics, Johns Hopkins University, and School of Medicine, USA on nebulizer use in inner-city children with asthma. To assess the frequency of nebulizer use, describe morbidity and patterns of medication administration, and examine the potential relationships between inhaled anti-inflammatory medication administration, asthma morbidity, and asthma management practices in children with asthma using a nebulizer compared with children with asthma not using a nebulizer. It was seen that, among 686 children identified, 231 (33%) reported current nebulizer use. Nebulizer users had significantly increased lifetime hospital admissions, hospitalizations, and emergency department visits in the last 6 months compared with non-nebulizer users (Butz, A. *et al*., 2000).

It was seen that, in our study population, 88.09% patients took any prescription asthma medicines with a nebulizer within last 3 months. And 11.90% patients didn't take any prescription asthma medicines with a nebulizer.

A survey by CDC'S National Asthma Control Program Grantees in 2013 state that 5.4% children or parents reported cost as a barrier to seeing a primary care physician or 2.3% an asthma specialist, and 9.8% purchasing prescription asthma medication (CDC'S, 2013). Whereas, in our study population, 32.38% patients could not go to specialist due of cost as it was expensive, also they think there was no need to go for further check-ups. And 67.62% patients could go to specialist for treatment, though they thought it was necessary for child.

6. Conclusion:

It is concerning that the global burden of asthma, which is already substantial in terms of both morbidity and economic costs, seems to be increasing rapidly as the world becomes more westernised. Low- and middle-income countries shoulder most of the asthma-related deaths. The recent Global Burden of Disease (GBD)study estimated that asthma was the 14th most important disorder in terms of global years lived with disability. Therefore when assessing health priorities, allocating resources, and evaluating the potential costs and benefits of public health interventions, asthma should be among the top priorities of Ministries of Health in low- and middle-income countries, like our country.

In our study, it was seen that, asthma knowledge and management was very poor in our country. People were not aware much about their child's asthma. So, awareness should be arisen by taking some social awareness step by government and non-government organization. The asthma action plan, asthma management plan, taking a course of asthma can minimize the risk factors. Parents should be taken all these important things from a doctor or other health professional. School authority also can play a role to increase the awareness by informing the patients and parents about asthma management.

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