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## Assessment of Aerosol Therapy in Respiratory Disorders; A Population-Based Study

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### ABSTRACT

**Background:** Aerosol therapy is a technique of administering drugs by inhalation. It is considered to be one of the cornerstones in the management of respiratory disorders. The improper use of aerosol devices may decrease its efficacy. **Objective:** To assess the role of aerosol therapy in respiratory related disorders and also to assess patient's perception towards aerosol therapy. **Materials and Methods:** A Prospective observational study using questionnaire was conducted for a period of 6months at Tertiary Care teaching Hospital in South India with a sample size of 110. People who agreed to participate in the survey were included. People who refused to give written consent forms were excluded. Data on prescribed drugs, diagnosis, duration of treatment were collected from the data entry. Patient's perception towards aerosol therapy were assessed by structured questionnaire. Collected data were analyzed using appropriate descriptive statistics like mean & percentage. **Results:** Out of 110 participants, 51% were Male and 49% were Female. Old aged patients (>45years) were suffering from respiratory disorders i.e, 51.81%. Almost 17.27% of our study participants were current smokers, 75.45% and 7.27% were past smokers. The major reason for admission were found to be cough with expectoration in 30.89% followed by breathing difficult in 28.45%. It was observed that patients were diagnosed with COPD i.e, 34.54%. Majority of the patients were prescribed with combination of bronchodilators (Budesonide+ Ipratropium bromide+ Levosalbutamol) 36.43%. Nebulizers were prescribed for 86.36% of patients followed by inhaler therapy for 11.81%. **Conclusion:** Knowledge and awareness of patients towards aerosol therapy and its method of administration was satisfactory. But the practice of aerosol therapy is deviating from guidelines.

## INTRODUCTION:

In medicine, pathological conditions affecting the alveoli, pleura and pleural cavity, bronchi, bronchioles, oropharynx, and trachea, as well as the breathing muscles and nerves, are referred to as "respiratory diseases." Some respiratory illnesses are minor and self-limiting. From the common cold to potentially fatal conditions like lung cancer, pulmonary embolism, and bacterial pneumonia. Respiratory infections are a major cause of mortality in young adults worldwide.<sup>1</sup>

Approximately 8–10% of adults suffer from asthma, making it one of the most common diseases. There are drug delivery systems available for a number of respiratory ailments. Today, there are many options for inhaled asthma therapy, starting with conventional nebulizers. Inhalers that function as bronchodilators can lose a great deal of their effectiveness, which can eventually be fatal. The improper use of controller inhalers can result in poor control of asthma, more emergency visits, and ultimately higher asthma management costs. Positive clinical outcomes, such as enhanced asthma control and decreased severity, have been demonstrated recently for an efficacious counseling intervention on asthma device use that pharmacists the drug experts prepared and delivered. Similar results were seen with DPI-targeted inhaler technique education interventions, showing a significant improvement in asthma control, inhaler technique, medication beliefs, quality of life, and patient satisfaction. Similarly, with Pressurized Metered Dose Inhalers (pMDIs), interventional studies improved asthmatics patients' inhaler technique demonstration skills.<sup>2</sup>

Chronic bronchitis and emphysema are among the illnesses referred to as "chronic obstructive pulmonary disease." A persistent cough and sputum production to severe, incapacitating shortness of breath that can seriously impair quality of life are just a few of the symptoms that patients with this condition are often at risk of exacerbating.<sup>3</sup>

Bronchodilators are commonly used as rescue and maintenance therapy in patients with respiratory disorders. Over time, the use of oral bronchodilators declined and varied amongst physicians; primary care clinics and non chest specialists were the most common settings in which they were prescribed. In order to reduce the use of insufficient oral bronchodilators and improve the administration of inhaled treatments, further research is necessary.<sup>4</sup>

The intensive care unit frequently uses aerosol therapy, which is frequently used for patients receiving mechanical ventilation. This technique, which involves inhaling gases containing

medicated particles, is linked to better long-term patient centered results. Many respiratory conditions, including infections of the respiratory system, are treated with aerosolized medications. Medication is injected straight into the lung. When compared to systemic administration, the therapy offers numerous benefits, such as targeted delivery into the lung, a quicker response, and fewer negative systemic effects. It was found to vary in different institutions and a knowledge gap among clinicians about how to administer aerosol delivery via mechanical ventilation was discovered.<sup>5</sup>

Several chronic respiratory disorders have been treated with inhalers for many years. 86% of Indian users of inhalers did not use them correctly, according to a study. One risk factor for both medication side effects and exacerbations is improper inhaler technique. Caregivers can improve their technique by concentrating on the appropriate areas after identifying these factors. It is necessary to make sure that inhalers are used effectively in order to lessen the financial burden associated with frequent acute attacks and hospital stays.<sup>6</sup>

Nebulizers are useful for delivering some controller medications as well as fast-relief medications for symptom relief, but they work best when used correctly. Young children frequently use nebulizers; among those under 12, the percentage ranges from 33% to 71%.<sup>7</sup>

Pressurized metered dose inhalers (pMDIs), dry powder inhalers (DPIs), and soft mist inhalers (SMIs) are the three primary appliance types used to administer inhaled medication. The benefits and drawbacks of each kind of inhaler device determine which patient is a good fit for it. Comprehending the advantages and disadvantages aids medical professionals in selecting the appropriate gadget for each patient's unique medical requirements and preferences. Thus, the pharmacology, particle size, drug deposition, and proper inhalation technique are important factors in the therapeutic success of inhalation therapy, but so are the patient's perception, preference, and level of satisfaction with the inhaler.<sup>8</sup>

The purpose of the Rota haler was to improve the efficiency and convenience of inhaled medication. Not only should the inhaler be designed with success in mind, but the instructions should also be optimized and made as simple as possible. According to recent clinical studies, many users continue to use inhalers incorrectly even after receiving instruction, and proper technique gradually deteriorates.<sup>9</sup>

This study is mainly aimed to assess the usage of aerosol therapy like use of nebulizers, inhalers, rotahalers etc. for the increased therapeutic efficacy and better patient care from

diseases like asthma and COPD. This study in turn help to assess the mistakes associated with the use of inhaled medications and help in correcting them and to prevent the misuse of those devices. So, we decided to conduct a study entitled **Assessment Of Aerosol Therapy In Respiratory Disorders; A Population Based Study** to assess the errors made by patients while using aerosol therapy.

## **METHODOLOGY**

A Prospective observational study was carried out for a period of 6 months from March 2023 to August 2023 in South India. The Sample size was 110. Data were collected through data entry form and structured questionnaire. Patient who agreed to participate in the survey were included in the study. Subjects who were refused to give consent and not able to communicate were excluded from the study. Structured data entry form was designed with socio-demographic characteristics of respondent like patient name, age, gender, weight and height, socioeconomic status and marital status. A special provision was included to record the information of patient regarding the use of aerosol therapy. The Questionnaire included 3 sections Section A includes Demographics details of patients including name, Age, Gender, Smoking Status and Educational Status. Section B consist of details regarding to the assessment of the knowledge of patient towards Aerosol Therapy. Section –C includes the details regarding to the Practice of patients towards aerosols therapy. Patient Consent form included the Name, Address, Age and Contact Number related the patient. It also included the patient's written consent for participating in our study along with his/her signature. If the patient is physically unfit for the same patient's bystander has given the consent. The study was approved by the IEC by issuing ethical clearance certificate. The questionnaire was validated using Cronbach's alpha statistical tool. The data were analyzed using descriptive statistics like percentages and mean.

## **RESULTS AND DISCUSSION**

A total of 110 patients who met the inclusion criteria were recruited into the study by calculating the sample size. Out of 110 patients who were willing to participate in the study men respondents were the majority as they were currently smokers as shown in Table 1.

**Table 1: Gender Distribution**

SI No	Gender	No. of Participants	Percentage (%)
1	Male	56	50.90
2	Female	54	49.09
<b>Total</b>		<b>110</b>	<b>100</b>

There are very few studies conducted in India that focuses on the use of Aerosol therapy for respiratory patients. Out of 110 participants who participated in our study most of them were old (>45years) i.e, 51.81% followed by Middle aged adult (31-45yrs) i.e, 24.54% followed by Children (0-16yrs) and Young Adults (17-30yrs) i.e,11.81%. This is depicted in Table 2. The mean age group of participants using Aerosol therapy was 27.5 years.

**Table 2: Age distribution**

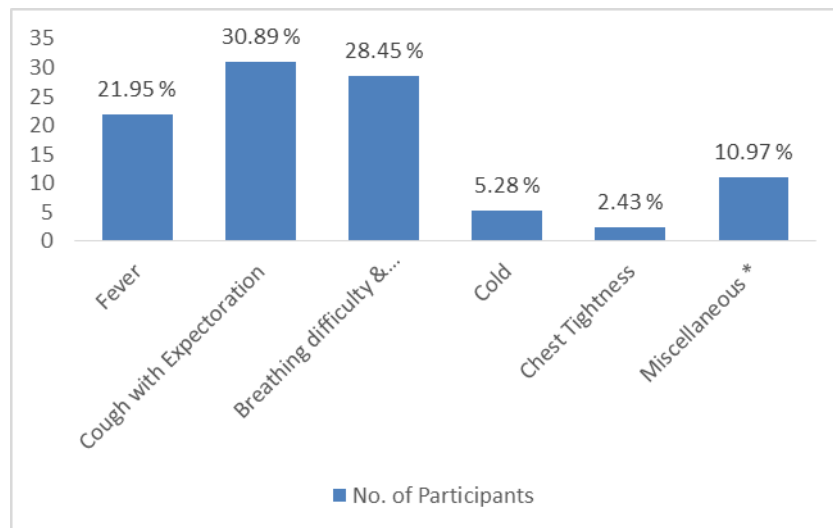
Sr.No	Age (in years)	No of participants	Percentage (%)
1	Children (0-16yrs)	13	11.81
2	Young adults(17-30yrs)	13	11.81
3	Middle aged adults (31-45yrs)	27	24.54
4	Old aged (>45yrs)	57	51.81
<b>Total</b>		<b>110</b>	<b>100</b>
<b>Mean age</b>		<b>27.5</b>	

While assessing the social history of 110 participants we found that about 75.4% participants were current smokers followed by 17.27% never smoked and remaining 7.27% as past smokers. This is depicted in Table 3. Smoking is the leading cause for many of the respiratory disorders especially COPD. Our results show that respiratory disorders are occurring due to the smoking status of the patients and even other factors like allergy may contribute to the respiratory disorders.

**Table 3: Smoking Status**

SL.NO	Smoking Status	No. of Participants	Percentage (%)
1	Never smoked	19	17.27
2	Currently Smoking	83	75.4
3	Past Smoker	8	7.27
<b>Total</b>		<b>110</b>	<b>100</b>

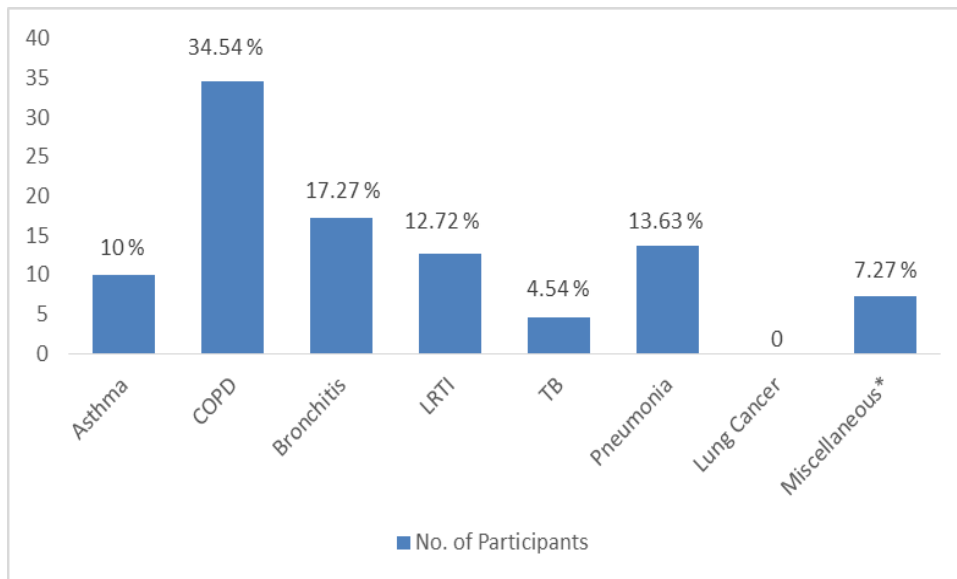
We found that out of 110 participants cough with expectoration (30.89%) was found to be the major reason for admission followed by breathing difficulty and breathlessness i.e, 28.45%. This is depicted in fig.1. These are the major complaints for respiratory disorder.



**Fig 1: Reason for Admission**

\*Includes Headache, wheezing, Cough without expectoration, Body ache

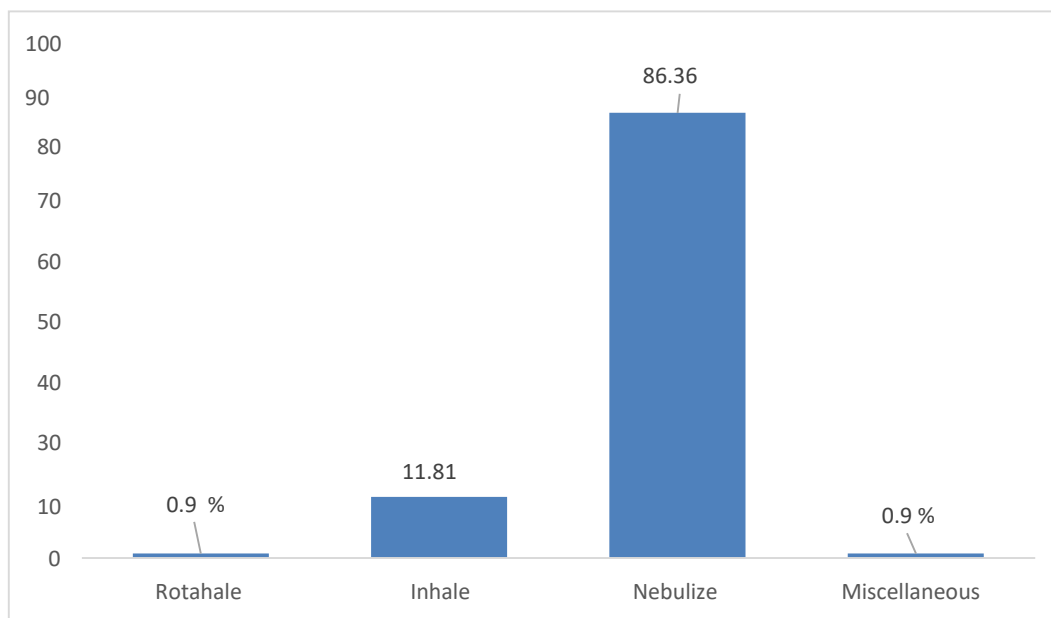
We found that majority of participants was diagnosed with COPD (34.54%) followed by Bronchitis in 17.27%. This is depicted in fig 2. This is due to increased number of smokers in our study.



**Fig 2: Diagnosis**

\*Includes acute laryngitis, Pleural Effusion, Bronchiolitis, Tracheitis etc.

Among 110 participants nebulizers were prescribed to 86.36% followed by Inhalers i.e,11.81%. Because Nebulizers are considered to be more effective in Pediatrics and Geriatrics and for the handling reason. This was depicted in fig 3.



**Fig 3: Types of Aerosol Therapy**

\*Includes spacers, Handihaler, Diskhaler, Twisthaler, Flexhaler etc.

While analyzing combination therapy of bronchodilators in study participants we observed that Budesonide + Ipratropium bromide + levosalbutamol was prescribed for 36.43% followed by Ipratropium bromide + budesonide for 20.93% of participants. Other combination of aerosol therapy which were prescribed for respiratory disorder patients were Budesonide for 15.50% followed by Salbutamol + budesonide for 10.07%. This is shown in table 4.

**Table 4: Types of Bronchodilators Prescribed**

Sr. No	Bronchodilators	No. of Participants	Percentage (%)
1	Ipratropium Bromide	11	8.52
2	Budesonide	20	15.50
3	Ipratropium Bromide + Levosalbutamol	3	2.32
4	Budesonide + Ipratropium bromide + levosalbutamol	47	36.43
5	Salbutamol + budesonide	13	10.07
6	Ipratropium bromide + budesonide	27	20.93
7	Levosalbutamol	8	6.20
<b>Total</b>		<b>129</b>	<b>100</b>

Among 110 participants observed, the major classes of medicines prescribed along with aerosol therapy were Antiulcer 20.4% of patients, antibiotics 68% of the patients. This is because antibiotics are primarily used for treatment of chest infections and other respiratory conditions. Antiemetics was prescribed for 15.4% followed by Analgesics & Antipyretic for 9.35% of the patients suffering from respiratory disorders as illustrated in Table 5.

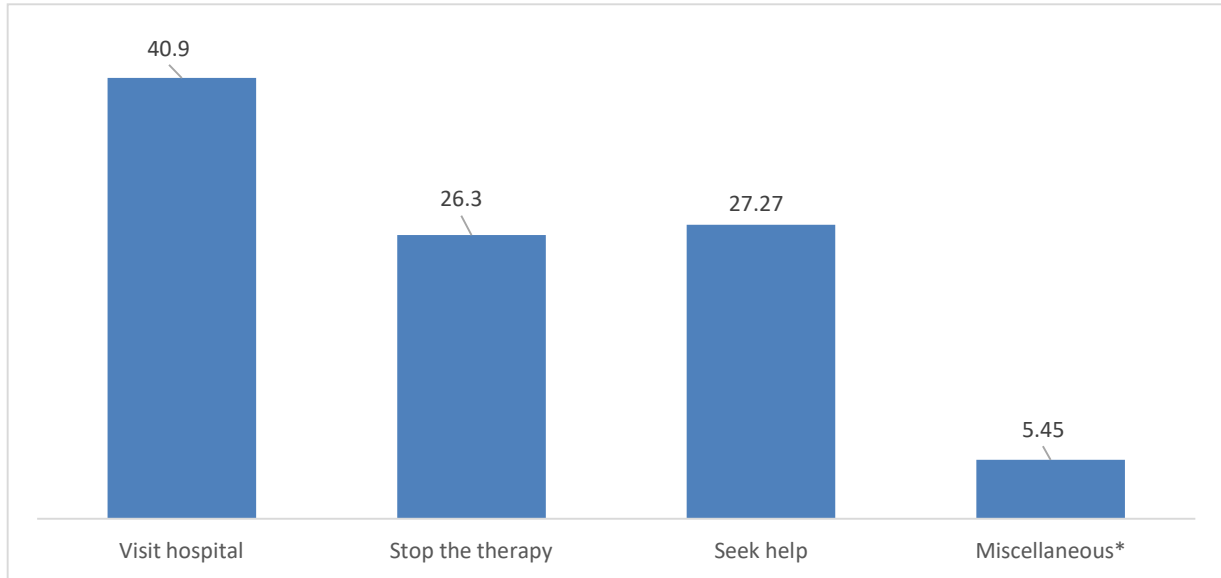


**Table 5: Concurrent Drugs Prescribed**

Sl. No	Concurrent drugs prescribed	No. of Drugs Prescribed	Percentage (%)
1	Antibiotics	68	19.8
2	Expectorant	1	0.29
3	Mucolytic	24	7.01
4	Corticosteroids	16	4.6
5	Electrolytes	15	4.3
6	Vitamins	13	3.8
7	Antiemetics	53	15.4
8	Antihistamine	2	0.5
9	Analgesic & Antipyretic	32	9.35
10	NSAIDs	15	4.38
11	Antiulcer	70	20.4
12	Miscellaneous*	33	9.64
<b>Total</b>		<b>342</b>	<b>100</b>

**\*Includes Anticholinergics, Anticoagulants, Diuretics, Antifungal etc.**

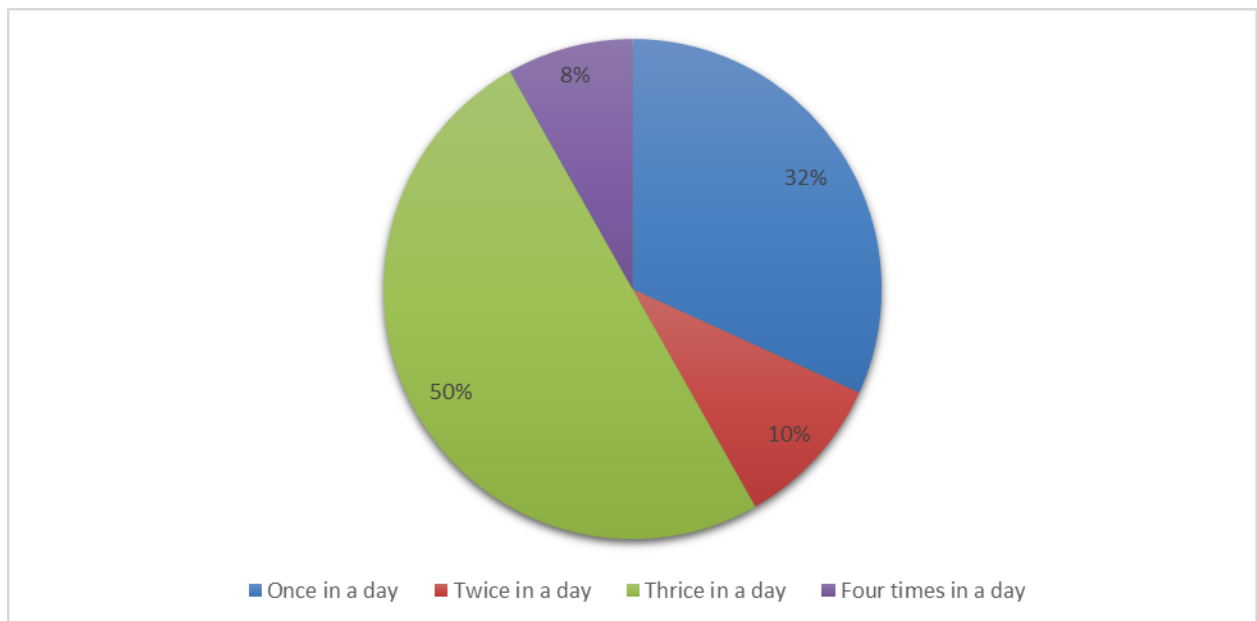
Out of 110 participants using aerosol therapy and the patient's practice while feeling uncomfortable in a questionnaire pattern 40.9% opined that they visit the hospital immediately after they feel uncomfortable with aerosol therapy. 27.27% seek other source of help rather than visiting hospital. This is depicted in fig 4.



**Fig 4: Patient practice while feeling uncomfortable on Aerosol Therapy**

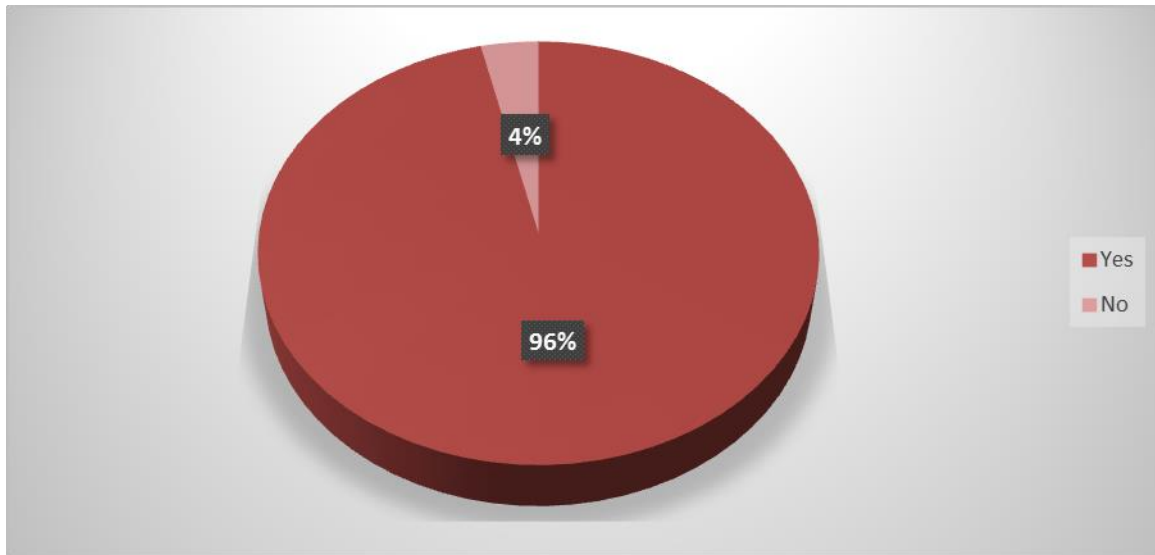
\*Includes Rinse the mouth with water or mouthwash, Get plenty of fresh air, Use a mask or a mouthpiece that fits well and is comfortable to use etc.

Among 110 participants 50% of the patients used aerosol therapy thrice a day followed by 32% used it once daily. Using aerosol thrice a day can increase its therapeutic efficacy and decrease the hospital stay and which indirectly leads to decreased economic burden. This is shown in fig 5.



**Fig 5: Frequency of administration**

The investigator asked all the participants whether there is a need to educate the consumers on the proper use of aerosol, 96% said there is a need to educate the consumers about the proper use of aerosol therapy and 4% were against it. This was depicted in Fig 6.



**Fig 6: Education of consumers about the proper use of aerosol Therapy**

## CONCLUSION

Our study assessed the usage of aerosol therapy among respiratory disorders patients. Our study finding shows treatment for respiratory disorders in our study hospital was suboptimal. Proper laboratory investigations like x-ray and spirometry were not performed. Patients need to be educated regarding the proper use of aerosols. It's the responsibility of health care professionals to create awareness on proper aerosol usage. Clinical pharmacist also plays an important role in procurement, distribution and utilization of aerosols for safe and effective management of respiratory disorders.

## CONFLICT OF INTERSET

The authors declared no conflict of interest.

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