

Effectiveness and evaluation of inhalation use techniques among Asthma and COPD patients attending a tertiary care hospital in South India

By G.K Balaji

Effectiveness and evaluation of inhalation use techniques among Asthma and COPD patients attending a tertiary care hospital in South India

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ABSTRACT

Aims. To assess the effectiveness and evaluation of inhalation use techniques among Asthma and COPD patients attending a tertiary care hospital in South India.

Method. This study is an observational study conducted at the Department of Pulmonary Medicine, Stanley Medical College, Chennai, India. 218 patients were selected for this study based on inclusion and exclusion criteria, and the study was conducted from June 2021 to December 2021. Study patients who are using inhalational therapy were interviewed with validated questionnaires consisting of 15 items of demographic details, patient knowledge, attitude, and their practice. Inhalational therapy education was provided to the patients, again interviews were conducted with 8 questions, responses to questions, and the demographic details were recorded.

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Results. A total of 218 patients were selected for this study (males: females-117 (53.7%): 101 (46.3%)), a higher number of patients age group was 46-65 years (44.9%), high illiteracy was found 146 (67.9%). Among the study subjects, farmers were high 73 (33.5%), 69 (31.7%) of patients were observed by physicians > 4 times of inhaler techniques, and patients washing their inhaler canister once a week were high 106 (48.6%). 107 (49.1%) of patients visited the Pulmonary Medicine department > 2 times, and active smokers were 118 (54.1%). The study patient's airway illnesses were either Asthma 151 (69.3%) or COPD 67 (30.7%), and the disease duration was >5 years.

A higher percentage of patients 120 (55.0%) were prescribed by Pulmonologists, and MDI without spacer inhalers was used by 147 (67.4%) of patients, and inhaler usage of <1 year was found in a higher total of patients. Before this study, a very small group of 31 (14.2%) patients received information on inhalational therapy, and regular inhalers were used by 193 (88.5%) of patients and 198 (90.8%) of the study patients considered the most preferred mode of therapy was inhalational therapy.

During the study duration, after patients received education on inhalational therapy, 166 (76.1%) of patients accurately understood the inhalational therapy techniques, and 71 (32.6%) of patients based on the Doctor's advice changed their inhalers. Saline gagging after inhalation therapy was followed by 68 (31.2%) of patients, and after education on inhalational therapy, 164 (75.2%) study patients think that the disease is well-controlled.

Conclusion. Several significant factors such as illiteracy, strong knowledge, disease duration, active smoking, periodic visits to physicians, and authentic pulmonologist prescription affect the patient's knowledge, attitude, and practice of inhalational therapy, hence patient-based prescription of inhalers, educating patients with audiovisual on every review, and quit smoking will reduce the patient's recurrent hospitalizations due to airway illness, higher expenditure, and permanent disability in patients on inhalation therapy.

Keywords: Inhalational Therapy, Asthma, Chronic Obstructive Pulmonary Disease (COPD), Inhalational Therapy Education (ITE), Knowledge, Attitude, Practice.

INTRODUCTION

The two most common chronic airway illnesses are ¹² asthma and Chronic Obstructive Pulmonary Disease (COPD). They significantly increase the worldwide disease burden and affect patients, caregivers, and healthcare systems [1]. Research and development efforts are trying to reduce the burden of airway illness patients by optimizing the usage of inhalers that concentrate on delivering the drug directly to the lungs thereby maximizing the therapeutic value for airway disease patients [2].

Inhalational therapy has a few limitations such as airflow limitation, poor techniques, non-adherence to inhaler therapy techniques, smoking, and nutritional status [3-5].

The patient's poor inhaler technique requires education on inhalational therapy and frequent observational assessment, and optimizing the device types is also essential. It is also essential to study the patient's inhalational therapy non-adherence behaviors, and self-management of inhalers. Understanding the mechanisms of inhalers is important to the patients, as the usage of inhalers by patients is self-management. When these inhalers are activated, a drug aerosol is produced. ²⁶ The drug becomes suspended or dissolved in the propellant, and reaches the patient's lungs as the patient breathes in, and reduces the symptoms of airway illness in patients, hence for the most appropriate usage of the inhalers, a leaflet's instructions and educating the patient is important [6].

Physician surveys of patient's knowledge and practice of inhalational therapy are valuable because they provide an overview ¹⁴ of the use of diagnostic techniques, management, pharmaceutical effects, technological usability, and the variables influencing the burden of

airway illness in the country, hence can provide the highlighted gaps in the treatment of airway illness [7]. Enhancing the utilization of inhalational therapy, diagnostic approaches, and monitoring instruments, education-based, observational demonstration of correct inhaler therapy is important, thus leading to effective inhalational therapy treatment [8]. Research discovered that family doctors, as opposed to general practitioners, and older, male doctors knew more about inhalers and were more willing to advise patients on them [9].

The cornerstone of treatment for patients using inhalers is patient education, and patients should be evaluated at each follow-up appointment to ensure that they are controlling the progression of their disease and avoiding further exacerbations by following a prescribed medication schedule and adhering to it, which will extend their life expectancy [10]. Patients who had inadequate knowledge of inhalational therapy tended to have inadequate practice, and patients must receive consistent health education and counseling regarding the appropriate use of inhalers [11].

From the published data, it is evident that there is a growing recognition that chronic airway illnesses are complicated, and patients' improper usage of inhalational therapy made a call for this present study to assess knowledge, attitude, and practice of inhalational therapy (IT) among patients with the more individualized and focused care in a Tertiary Care Hospital in South India.

Ethical clearance

After the ethical committee approval, under the guidance of a guide and, with the consent of patients, this study was conducted in the selected study subjects.

Conflicts-None

Funding-None

Inclusion criteria

The inclusion criteria for this present study were all patients with airway illness who are using inhalational therapy and who visited the hospital during the study duration.

Exclusion criteria

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The exclusion criteria for this present study were all patients with airway illness who do not use inhalational therapy and who visited the hospital during the study duration.

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MATERIALS AND METHODS

Methodology

Study Participants, Setting, Design, and Study Duration

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The Department of Pulmonary Medicine at Stanley Medical College in Chennai, India, is the research center that conducted this observational study. Based on inclusion and exclusion criteria, 218 patients were chosen for this study, which was from June 2021 to December 2021.

Study Procedure

Validated questionnaires comprising 22 questions consisting of patient knowledge, attitude, practice, and demographic information were used during interviews with study participants using inhalational therapy.

The demographic details and responses to 22 questions were recorded. Inhalational therapy education was provided, and validated 10 questions were observed and asked, and the responses for 10 questions were recorded. The responses were analyzed further to understand the patient's knowledge, attitude, and practice of inhalational therapy, and presented as tables and figures.

Data Collection

Data were collected from the study patients as responses to the validated questionnaires containing three sections, information on the sociodemographic traits, inhalational therapy patients' knowledge, and their practices. The demographic details were also collected. Inhalational Therapy education was provided, and again responses to specific questions were collected. The response of "0" is "Yes", and the "1" is "No", and based on the questions some of the questions had 5 responses also. Based on the questionnaire, the responses were collected and recorded.

Analysis

The 218 study patients' data were analyzed in 3 groups, one with demographic details, the second with in-depth insights of patients using inhalational therapy, and the third with knowledge, attitude, and practice of patients using inhalational therapy, and expressed in the result section.

Statistical Analysis of Data

Data analysis was done using SPSS software version 21. Data were expressed as frequencies and percentages in 3 groups, one with demographic details, the second with in-depth insights of patients using inhalational therapy, and the third with knowledge, attitude, and practice of patients using inhalational therapy.

RESULTS

A total of 218 patients were selected for this study (males: females-117 (53.7%): 101 (46.3%)), and their basic profile is tabulated in Table 1.

Table 1 Basic Profile of Patients Using Inhalator Therapy (IT) for Obstructive Airway Diseases (OAD)

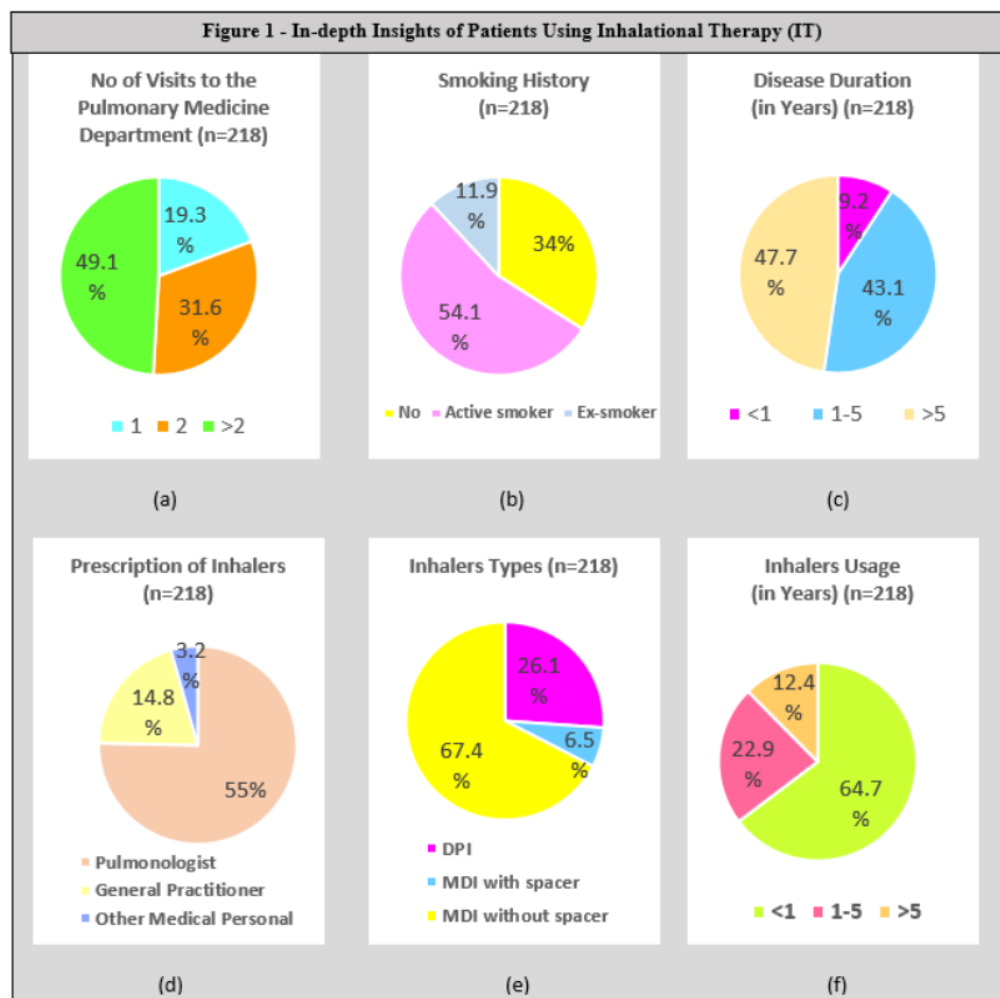
Variables	No (%)
Gender (n=218)	
Males	117 (53.7)
Females	101 (46.3)
Age Categories (in years) (n=218)	
≤25 years	29 (13.3)
26-45 years	61 (28.0)
46-65 years	98 (44.9)
>66 years	30 (13.8)
Education (n=218)	
Illiterate	146 (67.0)
Primary	37 (17.0)
Secondary	29 (13.3)
College	6 (2.7)
Employment (n=218)	
Farmer	73 (33.5)
Profession	8 (3.7)
Self Employed	18 (8.3)
Student	13 (5.9)
Housewife	49 (22.5)
Unemployed	57 (26.1)
Physician Observation of Inhalers Techniques (n=218)	
Never	32 (14.7)
Once	53 (24.3)
Twice	50 (22.9)
Thrice	14 (6.4)
Four or more times	69 (31.7)

Spacer/DPI Washing (n=218)	
Never	55 (25.2)
Once in week	106 (48.6)
Once in a month	57 (26.2)

The higher number of patients who are using inhalational therapy was males, than females. A higher number of patients who are using inhalational therapy was in the age group of 46-65 years (44.9%). A higher number of patients who are using inhalational therapy were illiterate 146 (67.9%) and a higher number of patients were employed as farmers 73 (33.5%). In 69 (31.7%) of patients, physicians observed more than 4 times patients' inhaler techniques, and a higher number of patients 106 (48.6%) washed their inhaler's spacer once a week (**Table 1**).

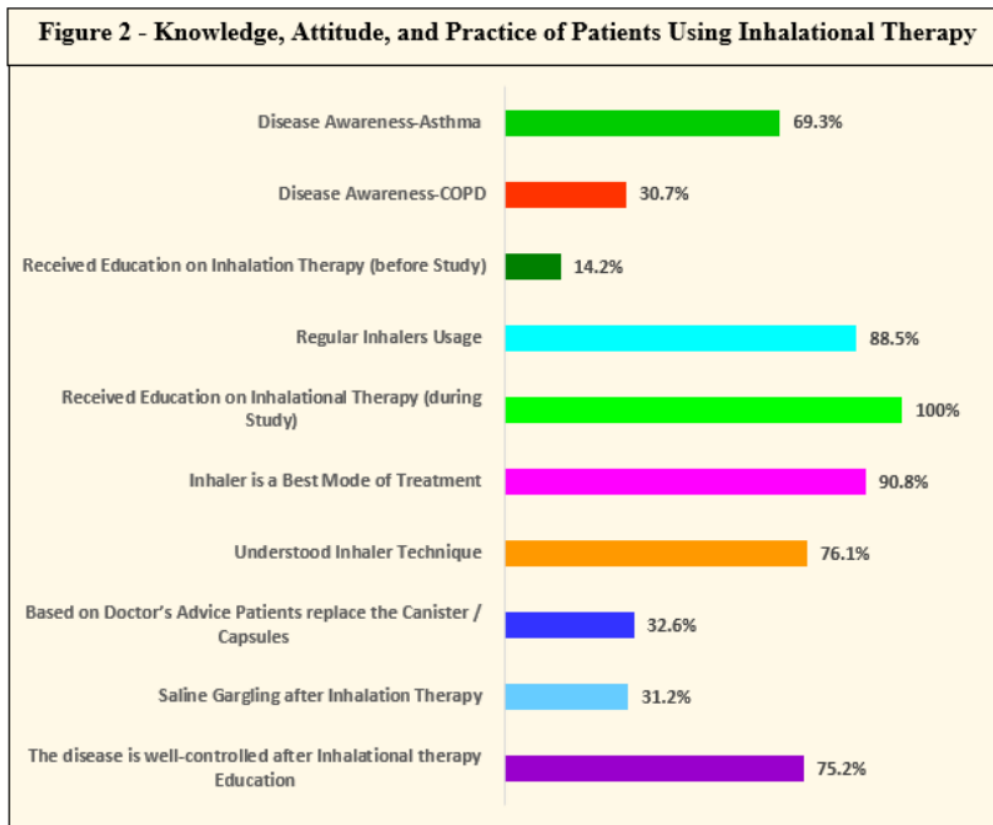
We also analyzed from the collected data, the in-depth insights of patients using inhalational therapy, and figured in **Figure 1 (a, b, c, d, e, f)**.

Figure 1 - In-depth Insights of Patients Using Inhalational Therapy (IT)



A higher number of patients 107 (49.1%) visited > 2 times to the Department of Pulmonary Medicine. Among the study patients who are using inhalational therapy higher number of patients were active smokers 118 (54.1%), and the study patients expressed their disease either as Asthma or COPD, and the disease duration was >5 years. A higher number of patients 120 (55.0%) informed that Pulmonologists were higher to prescribe inhalers to them. Among the study patients using inhalational therapy, a higher number of patients 147 (67.4%) of patients use MDI without spacer inhalers, and a higher number of patients 141 (64.7%) using their inhalers for <1 year (Figure 1 (a, b, c, d, e, f)).

We further analyzed the knowledge, attitude, and practice of patients using inhalational therapy, and plotted in Figure 2.

Figure 2 Knowledge, Attitude, and Practice of Patients Using Inhalational Therapy

A higher number of patients using inhalational therapy suffer from Asthma 151 (69.3%), and COPD was found in 67 (30.7%) of the study patients. A very small percentage of 31 (14.2%) patients received information on inhalational therapy before this study duration, and around 193 (88.5%) of patients use their inhalers regularly usage. Study patients 218 (100%) received education on inhalational therapy. Among the study patients, 198 (90.8%) of the study patients considered an inhaler as the most preferred mode of therapy for their diseases (Asthma, and COPD) (**Figure 2**).

After the study patients received education on inhalational therapy during the study duration, 166 (76.1%) of the patients learned and understood the inhalational therapy techniques. Despite education on inhalational therapy, only 71 (32.6%) of patients change their inhaler's canister based on the Doctor's advice, and 68 (31.2%) of patients follow saline gargling after inhalation

therapy. After education on inhalational therapy, 164 (75.2%) study patients think that the disease is well-controlled after inhalational therapy education (**Figure 2**).

DISCUSSION

⁴ In the present study, we found that male patients were higher than female patients, but in the study published by Goni MD et al, female patients were higher than male patients, [12]. ¹⁷ In the current study, a higher number of patients were in the age group of 46-65 years, whereas the published data by Zelalem BK et al showed a higher percentage of patients were in the age group of 41-59 years [13]. ¹⁰

In the current study, we found a higher number of patients are illiterate (67%), and in the study done in Malta, education is one of the significant predictors of non-adherence to the inhaling method in the patients [14,15]. The present study revealed that unemployed patients were 26.1%, whereas in the Alatawi A et al study, the unemployed patients were 56.3% which was higher than our study [16]. In this existing study, we found that physicians observed the patients while they were having inhalation therapy at least 4 times, and found several in-depth insights into patients using inhalational therapy, among the several findings, a higher number of study patients washed their inhaler canisters once in a week, and Sivadasan S et al study also published similar findings that their study patients also found cleaning is one of the predictor factors [17]. ⁴

The present study also found several in-depth insights, among them, patients visiting the pulmonary medicine department is one of the salient factors which is required in patients with inhalation therapy, and among the study patients, a higher number of patients around 49.1% visited at least >2 times, and the other significant factor that interferes in the appropriate adherence of inhalation therapy is smoking, the other in-depth insights was 54.1% of patients were active smokers, and chief in-depth factor was the duration of the disease, higher number of study patient's diseases duration was > 5 years, whereas Gare MB et al study published 81.1% of patients visited their physicians, active smokers were only 4 patients which was extremely lesser than our study, and also the duration of diseases was >3 years 31.8% of patients [18].

This current study alone reports who prescribed inhalers to the patients, among the study patients' a higher number of patients received prescriptions from pulmonologists for inhalation

therapy, whereas a study by Dumra et al published 47% of study patients were prescribed inhalers [19], Mebrahtom M et al published that patients require mastery for inhaler usage, [20], Roopavathy GM et al published for asthma, the inhalers are prescribed [21].

The present study reported that MDI without a spacer was used by a higher number of patients, and Dhand R et al study explained that the inhaled medication can be administered using pressurized metered-dose inhalers (pMDIs), dry powder inhalers (DPIs), or soft mist inhalers (SMIs). The benefits and drawbacks of each kind of inhaler device indicate which patient is a good fit for it [22]. In the current study, the higher number of patients usage of inhalers was <1 year and Çakmaklı S et al study patient's median duration (IQR:2) of therapy with inhalers was 4 years [23].

In this present study, only 14.2% of patients received education about inhalational therapy before the study, indicating 85.8% of patients did not receive any education, but still used the inhalers as an inhalational therapy. The studies are evident that despite their claims to know how to inhale their medication, 88.57% of the patients did not utilize their inhaler devices correctly [24-26]. In the existing study, we found before education only 14.2% of patients knew education on inhalation therapy, this outcome is comparable to what was discovered by Milena Kovacevic et al, and Wafaa Gameel et al published studies in which the authors explained that in comparison to the initial visit, patients' inhaler practices were substantially better in several of the post-intervention steps [27,28].

In conclusion, this present study found the major significant factor affecting the patient's knowledge, attitude, and practice of inhalational therapy was illiteracy, one of the significant predictors of non-adherence to inhalation technique. The inhalation technique is strongly correlated with knowledge. Individuals who were well-versed in self-management and medicine inhalation methods were more likely to be efficient than those who were not. Disease duration, active smoking, and prescription by authentic Pulmonologists are also factors that affect a patient's proper adherence to inhalation therapy.

As inhalational therapies are a useful tool for patients with respiratory conditions, but they can be challenging to use appropriately and accurately, hence our present study also suggests periodic visits to physicians are an important factor that every patient using inhalation therapy must follow, and patient-based prescription of inhalers is also a key factor. Quit smoking, educating patients about airway illness and demonstrating proper inhaler methods before

patients are discharged from the hospital, in addition to the manufacturer's inhaler user guidelines, a brief audiovisual, handout infographics, and periodic reviews, and on each review educating the patients with proper inhalation therapy will reduce the burden of airway illness patients' complications leading to a reduction of patient's recurrent hospitalizations due to airway illness, high cost, impairment, and death due to improper usage of inhalation therapy.

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Conflict of Interest: None

Author's Contribution

First Author- Roshan - *Study Design, Data Collection,*

Second Author- G. K. Balaji - *Data Collection*

Third Author- Pajanivel-, *Critical revision*

Fourth Author- J. Janifer Jasmine - *Analysis, Manuscript preparation*

Corresponding Author- G. K. Balaji -*Approval*

Tables-1

Figures-2

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