Original Research Article

A study to evaluate the knowledge, attitude, and practice for the use of inhalational devices among asthma patients and copd patients in a tertiary-care teaching hospital, a cross-sectional study

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ABSTRACT

Background: Chronic respiratory diseases, such as asthma and COPD, are significant global health problems that affect people of all ages and socioeconomic groups. According to the WHO, CRDs are responsible for approximately 4 million deaths worldwide each year, with asthma and COPD accounting for the majority of these deaths. The study also found that patients who used inhalation devices had better disease control and quality of life than those who did.

Statistical Analysis: The recorded data was entered into Microsoft Excel and analysed using SPSS 26. The data was segregated category-wise, depending on asthma or COPD. We compared the responses of different categories of inhalation devices. The data was analysed using descriptive statistics. Frequencies and percentages were used to represent responses to the questions.

Results: An exit interview technique was adopted for data collection. The patients who exited from the OPD and who are asthma-COPD patients who had been using an inhaler were identified through diagnostic tests carried out. Regarding knowledge, the frequency of correct answers to each question was scored 1. The practice was examined by using the inhaler checklist. The performance of each of the steps of inhaler use was labelled as a correct inhalation technique if the respondent correctly performed each of the checklist steps. Out of total of 90 responses recorded, 46.6% were COPD and 53.4% were Asthma patients. Overall knowledge of inhalation devices is 39.5% with the poorest question "How should you clean an inhalational device?" which is 28.9%. 48.9% of patients have attitude that they will not recommend inhalation device to other. The practice score for MDI is 58.8% and for rota haler 69.4% in patients.

Conclusions: Proper knowledge and techniques for using inhalational devices are mandatory to control the disease. It can be achieved by educating patients and increasing awareness.

1. Introduction

COPD is a life-threatening lung disease characterized by chronic airflow obstruction that can't be fully reversed. It includes chronic bronchitis and emphysema.[1,2] It is an increasing cause of morbidity and mortality and an economic burden on the health care system.[3,4]

Pharmacological therapies for COPD include bronchodilators (beta 2 agonists), antimuscarinic drugs/anticholinergics, corticosteroids, methylxanthines, and phosphodiesterase-4 inhibitors. Among these drugs, bronchodilators, anticholinergics, and corticosteroids are best administered through aerosol therapy.[5–7]

Chronic respiratory diseases (CRD), such as asthma and COPD, are a major global health problem affecting people of all ages and socioeconomic classes. According to the

World Health Organization (WHO), CRDs are responsible for approximately 3.23 million deaths worldwide each year, with asthma and COPD accounting for the majority of these deaths. In recent years air pollution was responsible for approximately 3.2 million deaths worldwide, with respiratory diseases accounting for a significant proportion of these deaths.[8]

According to data from 2019, the Global Burden of Disease (GBD) collaborators reported that more than 260 million individuals worldwide experienced inadequately managed asthma.[9,10] In developing nations, the economic impact of asthma is significantly costing an estimated $20 billion every year.[11]

In India, the prevalence of inhalation device usage in CRD is relatively low compared with other countries. According to a 2020 study conducted in India, only 19.2% of patients with asthma and 22.4% of patients with COPD reported using inhalation devices. However, the study also found that patients who used inhalation devices had better disease control and quality of life compared to those who did not use inhalation devices.[12]

The study found a significant association between air pollution and respiratory disease, with participants living in areas with high air pollution having a higher risk of respiratory disease.[12] With this context, the present study aims to assess the knowledge and practice of the use of inhalation devices among asthma and COPD patients in a tertiary teaching hospital in Gujarat, India.

2. Ethical Consideration

The study was conducted after approval of the proposal by the Institutional Ethics Committee (IEC). Informed verbal and written consent were obtained before data collection. Written informed consent was obtained from the illiterate members by recording a thumbprint. There was no risk to participants. Participants benefited from being offered the opportunity to observe the correct inhalation technique in a video. Respondent confidentiality was maintained by coding responses. The information collected was used only for the study, and the information was not misused for other purposes. For safety reasons, no harmful treatment was performed on the respondents.

3. Materials and Methods

This was an Institutional-based cross-sectional study conducted on Asthma and COPD patients who were attending the pulmonary medicine OPD in a tertiary care teaching Hospital attached to a government medical college, between May 2023 and October 2023. A total of 137 patients were approached and 90 patients were selected after assessing for eligibility criteria. A purposive Sampling technique was used for patient allotment. Eligibility criteria include: those patients who were diagnosed with asthma

and COPD and who had been using an inhaler for 1 month were identified from the patients' examination cards and laboratory and radiographic findings and those who gave informed consent to participate in the study were included. Those who did not give consent were excluded.

3.1. Data collection procedure

A pretested semi-structured questionnaire was developed by the researcher himself with the help of an extensive study, and consultation with peers and chest physicians which was used to collect information on socio-demographic variables, knowledge, and attitude on the safe handling of the inhaler.

An exit interview technique was adopted for data collection. The patients who exited from the OPD and who were asthma and COPD patients who had used an inhaler were identified based on the examination card and diagnostic tests carried out. The purpose of the study was explained and verbal and written consent were collected by PI & Co-PI with information about the nature of the study and the participant's role in the research. Fingerprints were taken from the illiterate participants after verbal consent was obtained. The questionnaire was administered by the interviewer (PI&COPI) in a separate room in the OPD (between the OPD time of 9 a.m. and 2 p.m.).

Regarding knowledge (n=8 questions), the frequency of correct answers to each question was scored 1. The attitude questions (n=5 questions) were 4-point Likert-based questions. The practice was assessed using the inhalation checklist which was adapted from the Dutch Asthma Foundation[13] to investigate inhaler practice. The execution of each of the steps of the inhalation application was called a correct inhalation technique if the respondent correctly performed each of the steps of the checklist. The execution was labelled incorrect if the patient was unable to perform the steps correctly and/or omitted some of the steps. After the examination of the inhalation technique, the incorrect method used by the patient was explained to the patient. After that, the patients were shown a video with the correct inhalation technique. Care was taken to ensure that the questions were clear, concise, and easy to understand by the participants.

The questionnaire was written in English and translated into its own vernacular language by the researcher. The questionnaire was cross-checked by a bilingual expert and then translated back into English again by a separate bilingual expert to ensure the stability of the questionnaire.

3.2. Statistical analysis

After data collection, data was entered into Microsoft Excel as codes. Descriptive statistics were used to describe socio-demographic characteristics. Data was analysed with a statistical chi-square test to determine the associated factors. Data was stored and analysed on a password-protected

computer. Only the PI and the co-PIs have access to the data.

4. Results

4.1. Background characteristics of respondents

The study showed that nearly half (56.6%) of the inhalational device users belonged to the ≥50 years age group. The overall mean and SD of the age of those users was 51.3±18.72. More than half of the COPD and asthma patients using inhalational devices were males (58.8%) and from rural areas (50%) (Table 1).

Table 1: Background characteristics of patients using inhalational devices

Background characteristics	Number	Percentage
Age		
<50	39	43
≥50	51	57
Sex		
Male	53	59
Female	37	41
Area		
Rural	45	50
Urban	45	50
Disease		
COPD	42	47
Asthma	48	53
Duration of Devices usage		
<4 years	48	53
≥4 years	42	47

4.2. Knowledge about inhalation devices among COPD and asthma Patients

The majority of the inhalational device users (54.5%) had average knowledge about the inhalational device with a mean of knowledge is 3.1±2.82 standard deviation. Correct responses to all knowledge questions are shown in Chart 1. The least correct question about the inhalational device is "How to clean an inhalational device" Only 28.9% of patients knew about the correct method to clean the device. Urban resident patients have 4.06 times higher odds (CI 95% 1.67 to 9.79, P: 0.001) of having good knowledge. COPD patients have 4.37 times higher odds (CI 95% 1.8 to 10.6, P: 0.001) of having good knowledge than asthma patients (Table 2).

4.3. Attitude about inhalation devices among COPD and asthma patients

In the 4-point Likert-based questionnaire mean attitude score of patients is 8.2±3.53 standard deviation. A total of 54 (60%) patients have a good attitude of using inhalational devices. Urban resident populations have 2.57 times higher odds (CI 95% 1.07 to 6.14, P: 0.031) of having a good
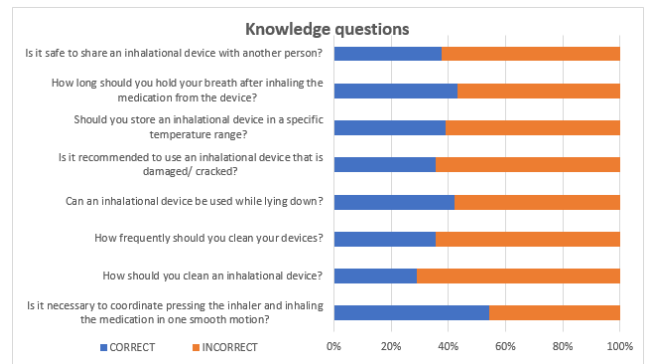

Chart 1: Correct responses to all knowledge questions

attitude toward inhalation device usage. Patients who have been using inhalation devices for less than 4 years have 2.67 times higher odds (CI 95% 1.12 to 6.36, P: 0.026) of having a good attitude towards inhalation device usage (Table 3). Responses to all attitude questions are shown in Chart 1.
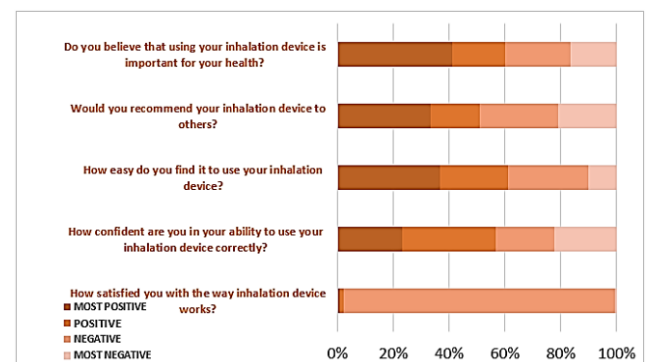

Chart 2: Responses to all attitude questions

4.4. Practice about inhalation devices among COPD and asthma patients

Out of 90 patients, only 19 patients showed 100% correct steps of using inhalational devices and 14 patients missed any of one step for using the correct way of inhalational devices according to Dutch association criteria. Patients aged less than 50 years have 5.15 times higher odds (CI 95% 1.66 to 15.97, P:0.004) of having good practices than the age above 50 years. Urban resident patients have 3.6 times higher odds (CI 95% 1.17 to 11.11, P: 0.025) of having good practices than the rural population. Patients who have been using inhalational devices for less than 4 years have 3.04 times higher odds (CI 95% 0.99 to 9.36 P: 0.049) of having good practice than the patients who have been using them for more than 4 years (Table 4) Responses to all practice questions are shown in Charts 3 and 4.

Patients who have good knowledge of inhalational devices have 4.08 times higher odds (CI 95% 1.23 to 13.51,

Table 2: Association betweenknowledge and background characteristics

Variablen (%)	Knowledge		Odds Ratio(95% CI)	P-value
	Good	Bad		
Age				
<50 years	31(34.4)	8(8.88)	1.38(0.59 to 3.20)	0.451
≥50 years	18(20)	33(36.6)		
Gender				
Male	27(30)	26(28.8)	1.41(0.60 to 3.30)	0.425
Female	22(24.4)	15(16.6)		
Area				
Urban	32(35.5)	13(14.4)	4.06(1.67 to 9.79)	0.001
Rural	17(18.8)	28(31.1)		
Disease				
COPD	15(16.6)	27(30)	4.37(1.80 to 10.6)	0.001
Asthma	34(37.7)	14(15.5)		
Duration of Devices				
<4 years	27(30)	21(23.3)	1.16(0.50 to 2.68)	0.713
≥4 years	34(37.7)	14(15.5)		

Table 3: Association between attitude and background characteristics

Variablen (%)	Attitude		Odds Ratio(95% CI)	P-value
	Good	Bad		
Age				
<50 years	25(27.7)	14(15.5)	1.35(0.57 to 3.19)	0.487
≥50 years	29(32.2)	22(24.4)		
Gender				
Male	32(35.5)	21(23.3)	1.03(0.44 to 2.44)	0.93
Female	22(24.4)	15(16.6)		
Area				
Urban	32(35.5)	13(14.4)	2.57(1.07 to 6.14)	0.031
Rural	22(24.4)	23(25.5)		
Disease				
COPD	22(24.4)	20(22.2)	0.55(0.23 to 1.29)	0.169
Asthma	32(35.5)	16(17.7)		
Duration of Devices				
<4 years	34(37.7)	14(15.5)	2.67(1.12 to 6.36)	0.026
≥4 years	20(22.2)	22(24.4)		

Table 4: Association between practice and background characteristics

| Variablen (%)	Practice		Odds Ratio(95% CI)	P-value
	Good	Bad		
Age				
<50 years	14(15.5)	25(27.7)	5.15(1.66 to 15.97)	0.004
≥50 years	5(5.5)	46(51.1)		
Gender				
Male	9(10)	44(48.8)	0.55(0.19 to 1.53)	0.254
Female	10(11.1)	27(30)		
Area				
Urban	14(15.5)	31(34.4)	3.6(1.17 to 11.11)	0.025
Rural	5(5.5)	40(44.4)		
Disease				
COPD	7(7.7)	35(38.8)	0.67(0.23 to 1.93)	0.461
Asthma	11(12.2)	37(41.1)		
Duration of Devices				
<4 years	14(15.5)	34(37.7)	3.04(0.99 to 9.36)	0.049
≥4 years	5(5.5)	37(41.1)		
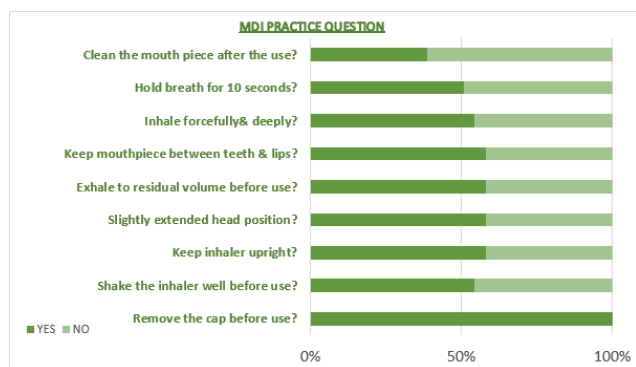
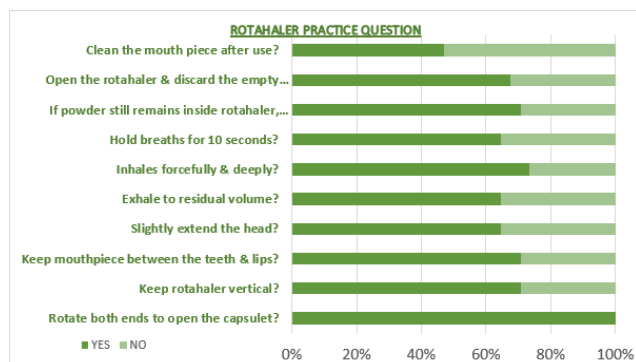Chart 3: Responses to all practice questions for MDI use

Chart 4: Responses to all practice questions for Rota Haler use

P: 0.02) of having good practices of using in the correct way of inhalational devices.

5. Discussion

The results of this study on overall knowledge and practice of inhalation techniques among patients are alarming. On average, each patient had a knowledge score of 3.1±2.82, which could be attributed to a lack of patient questioning and negligence towards reading the drug box instruction leaflet, and poor instruction from healthcare providers.

Most patients (n= 71, 78.8%) could not perform all the steps of inhalational device usage correctly. The Dutch Asthma Foundation checklist revealed that the least correctly performed step was holding breath for at least 10 seconds followed by, cleaning the mouthpiece after use, and inhaling forcefully and deeply. The most common error was not being able to hold one's breath for 10 seconds (42.6%). This error could be due to a lack of supervision, and follow-up checks on inhalation techniques by healthcare providers, poor instruction, and their emphasis on item skills. This error leads to poor treatment outcomes as it hinders the deposition of inhaled drugs into the lungs. The quality of instruction from healthcare providers and their emphasis on item skills could be associated with this inconsistency in

inhalation techniques.

Regarding practice, the study found that correct usage was associated with younger age (p=0.004)[14–16] urban areas of residence (p=0.025),[17] and duration of device usage less than 4 years (p=0.049). Therefore, it is essential to frequently check and train inhalation techniques among the elderly population. Similarly, the quality of healthcare services might be poor among rural residents, leading to improper knowledge and practice of inhalation techniques.[18,19]

This study highlights the need for healthcare personnel to demonstrate the technique for inhalation practically and conduct re-demonstrations from the patients at each visit to ensure accurate drug intake and achieve the best results of treatment.

6. Conclusion

The study found that patients with COPD and asthma who use inhalers and attend a tertiary care teaching hospital have a satisfactory level of knowledge but poor practice when it comes to using inhalers. The most common mistake made by inhaler users is not holding their breath for at least 10 seconds and not cleaning the mouthpiece after use. However, users are better at following essential steps of the inhalation process compared to the total steps. Poor inhaler practice is more common among elderly patients, those who live in rural areas, and those who have been using the device for more than 4 years. The study highlights the need to improve the knowledge and practice of inhaler use in order to effectively treat COPD and asthma.

6.1. Limitation

This was a small-scale cross-sectional study that used a nonprobability sampling technique to gather data from COPD and asthma patients attending a single setting. However, the sample size of the study was narrow, with only 90 participants, which limits the generalizability of the results. Additionally, due to time constraints, the study did not assess drug-specific concerns of care when evaluating knowledge.

6.2. Implications

This study's findings can serve as a helpful guide for healthcare providers to improve their instruction on inhalation devices, emphasizing the frequently committed errors. These results can also assist hospitals in creating and enforcing a comprehensive health teaching protocol for COPD and asthma patients. The protocol should include clear instructions, demonstrations, and re-demonstrations of using the rota-haler and MDI.

7. Author Contributions

The author contributed to developing, collecting, analysing, and approving the report, and is accountable for all aspects of the work.

8. Source of Funding

None.

9. Conflict of Interest

None.

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