

## ORIGINAL ARTICLE

# Study on Utilization Pattern of Pulmonary Inhalers in Inpatient at Tertiary Care Teaching Hospital, Coimbatore, India

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## ABSTRACT

**Objective:** Aim of the study was to assess medication adherence to understand various determinants of medication non-adherence in inpatients at a tertiary care hospital, Coimbatore, India.

**Methodology:** It is a prospective observational study conducted in the inpatient department at a Tertiary Care Teaching Hospital. Asthma or COPD patients were randomly recruited over six months from the ward's clinics. The inhalation technique was assessed utilizing the questionnaires there were 11 steps for MDI and 12 steps for MDI + spacer each correct technique conveyed a score of 1 and the wrong technic conveyed 0. The adherence to the inhaler technique was assessed utilizing the recipe correct dose/incorrect dose\*100 and the purposes behind nonadherence were additionally noted.

**Result:** In our study out of 120 patients 53.3% were diagnosed with COPD and 46.7% were asthmatic, and 10.8% asthmatics and 20% COPD patients were endorsed with budesonide MDI. About 10% of asthmatics and 9.1 COPD patients have endorsed with budesonide MDI+ spacer. About 4.1% asthmatics and 2.5% COPD patients were endorsed with salbutamol MDI. About 17% asthmatics and 10% COPD patients were endorsed with MDI ipratropium and 8% asthmatics and 12.5% COPD patients were recommended with ipratropium MDI+ spacer. At the point when the knowledge concerning the use of inhalers was surveyed utilizing standard questionnaire, which had 11 steps for MDI and 12 steps for MDI+ spacer every questionnaire had scoring of 0 addressing not playing out the progression, 1 addressing following the progression the scores were high after pharmacist intervention when contrasted with before pharmacist intervention

**Conclusion:** The current outcomes feature the requirement for pharmacist interventions pointed toward improving adherence to inhalers in COPD and asthmatic patients.

**Keywords:** *adherence, chronic obstructive pulmonary disease, Inhalers, Asthma*

## INTRODUCTION

asthma is perhaps the most well-known ongoing sicknesses in the world. Asthma horribleness and mortality are increasing in various developed countries. Based on the American Health Interview Survey sample (2009), it has been found that 39.9 million Americans and including 7.1 million children were diagnosed with asthma. Asthma is likewise regular in industrialized countries, for example, Canada, England, Australia, Germany and New Zealand with higher data of prevalence rate goes from 2% to 10% of asthma gathered from these countries. Factors affecting this disease include urbanization, air pollution, passive smoking, and also allergens.<sup>1</sup> As being reported in Malaysia's Ministry of Health Second National Health and Morbidity Survey (1997), the prevalence of asthma among adults is 4.1% in the population. In the same study, it was also reported that asthma prevalence is higher in rural areas (4.5%) than in urban areas (4.0%). WHO reported that COPD ranked 4th from 136 diseases being assessed with 3 million deaths that year.<sup>2</sup> This statistic includes 6 WHO regions including Africa, America, East Mediterranean, Europe, South-East Asia, and Western Pacific region, WHO also estimated about 64 million people have moderate to severe COPD. Three million people died from COPD in 2005 and this contributed to 5% of all death throughout the world. In 2006, COPD is the 4th leading cause of death in the U.S., with a death rate of 39.9 per 100,000. It was also found that more women (63,006) than men (57,970) died due to COPD.<sup>3</sup>

Patient adherence can be defined as the extent to which an individual's conduct concurs with health-related exhortation and capacity of the patient to go to facility arrangements as scheduled, accept meds as endorsed, make conceivable lifestyle changes, and complete prescribed investigations.<sup>4</sup> Adherence to pharmacologic therapy has been accounted for to be low among patients with Chronic Obstructive Pulmonary Disease (COPD) and related to helpless guess. At present, little is thought about the extent and management of adherence problems among patients with constant bronchitis and emphysema.<sup>5</sup> In persistent wind current deterrent various classes of medications are regularly utilized in combination, and regimens requiring different everyday doses of every agent. The subsequent dose schedules are frequently very complex. It has been viewed as that complex treatment regimens should bring about helpless compliance.<sup>6</sup> Asthma is a common and chronic condition characterized by reversible airflow obstruction, airway inflammation, and increased airway responsiveness to a variety of stimuli. Poor asthma control is responsible for a large proportion of the total cost of the disease, and both indirect and direct costs would decrease if control were improved. Poor compliance with prescribed therapy leads to increased morbidity and mortality. Studies have announced that half of the patients with persistent sickness including asthma don't utilize their medicine or don't utilize it as prescribed.<sup>7</sup> There is a checked variety in remedial compliance from complete adherence to not exactly a fourth of the recommended doses of breathed-in prophylactic agents in asthma.<sup>8</sup>

**METHODOLOGY**

a hospital-based prospective interventional study is conducted in the Pulmonology department at tertiary care hospital, Coimbatore, India. Patients diagnosed with COPD/Asthma. The patient demographics and all therapeutically relevant information is noted in a predefined data assortment structure. A sum of 150 inpatients was remembered for this study. Prescriptions and treatment graphs of inpatients were explored tentatively for endorsed patterns of inhalers and anti-asthmatic and COPD drugs. The prescription guidelines, restorative guidelines, Micromedex, Medscape, and reference books will be utilized as devices to audit the prescription and case diagram. The confirmation register will be explored for the prescription of any inhalers and anti-asthmatic and COPD drugs. The case sheet, treatment graph, physician notes will be oppressed for catching any information related to the study. All restoratively relevant information was noted in a predefined data assortment structure. On the other hand, these case outlines were investigated for the prescription of inhalers and anti-asthmatic medications. The demographic data and the nitty-gritty history of the patient in regards to past, present, family, individual, and medication history were taken. Different subtleties like the current finding, justification for the current confirmation, any examinations are done to affirm the determination were likewise noted. Additionally, discovered medication associations of inhalers and anti-asthmatic medications and medication choice, measurement structures, course, recurrence, indication were likewise contemplated. The legitimate inhalation

technique was assed utilizing the questionnaires there were 11 steps for MDI and 12 steps for MDI + spacer each correct technique conveyed a score of 1 and the wrong technic conveyed. The adherence to the inhaler technique was assessed utilizing the equation correct dose/incorrect dose\*100 and the explanations behind nonadherence were additionally noted. The helpful unseemliness of recommended inhalers and antiasthma spasm drugs is determined with standard guidelines. The progressions and the daily notes in the case sheets were followed until the patient is discharged. The cost involved in the use of inhalers in therapeutic inappropriateness is also considered. All data was timely updated and analyzed by using suitable software.

**RESULT AND DISCUSSION**

In our study out of 120 patients 53.3% were diagnosed with COPD and 46.7% were asthmatic, out of which 31.6% were men 15% females were asthmatics, and 48.3% guys and 5% female were of COPD. 14.1% guys and 7.5% female asthmatics were of the age bunch 46-64 years. 19.1% guys and 0.8% females with COPD were of the age bunch 46-64 years. The highest number of patients for example 18.3% male, 9.1% female asthmatics, 23.3% male, and 3.3% female asthmatics had the illness going from 1-10 years. Among asthmatic patients, 7.5% male were smokers, and 3.3% men were heavy drinkers alcohole. Among COPD patients 26.6% of men were smokers and 5.8% of men were alcoholics. Table 1

Table 1: Demographics characteristics of enrolled asthma and COPD patients

Basic variables	Asthma						COPD					
	Male	(%)	Female	(%)	Total	(%)	Male	(%)	Female	(%)	Total	(%)
No. of patients enrolled in the study	38	(31.6)	18	(15)	56	(46.7)	58	(48.3)	6	(5)	64	(53.3)
No. of patients completed study	38	(31.6)	18	(15)	56	(46.7)	58	(48.3)	6	(5)	64	(53.3)
Age in years												
18-45	8	(6.6)	3	(2.5)	11	(9.1)	16	(13.3)	2	(1.6)	18	(15)
46-64	17	(14.1)	9	(7.5)	26	(21.6)	23	(19.1)	1	(0.8)	24	(20)
>65	13	(10.8)	6	(5)	19	(15.8)	19	(15.8)	3	(2.5)	22	(18.3)
Subtotal	38	(31.66)	18	(15)	56	(46.6)	58	(48.3)	6	(5)	64	(53.3)
Duration of disease(year)												
<1												
1-10	7	(5.8)	6	(5)	13	(10.8)	11	(9.1)	21	(17.5)	32	(26.6)
≥11	22	(18.3)	11	(9.1)	33	(27.5)	28	(23.3)	4	(3.3)	32	(26.6)
Subtotal	5	(4.1)	1	(0.8)	6	(5)	19	(15.8)	1	(0.8)	20	(1.6)
	34	(28.3)	18	(15)	52	(43.3)	58	(48.3)	26	(21.6)	84	(70)
Social habits												
Smoker	9	(7.5)	0	(0)	9	(7.5)	32	(26.6)	0		32	(26.6)
alcoholic	4	(3.3)	0	(0)	4	(3.3)	7	(5.8)	1	(0.8)	8	(6.6)

Table 2: Usage pattern of inhalers in the study population

Class of drug	Name of the drug	Dosage form	Asthma (n=56)						COPD (n=64)					
			M	(%)	F	(%)	Total	(%)	M	(%)	F	(%)	Total	(%)
corticosteroids	budesonide	MDI	12	(10)	1	(0.8)	13	(10.8)	23	(19.1)	1	(0.8)	24	(20)
		NEBULIZER	4	(3.3)	0	(0)	4	(3.3)	2	(1.6)	0	(0)	2	(1.6)
		MDI+SPACER	9	(7.5)	3	(2.5)	12	(10)	5	(5.8)	4	(3.3)	9	(7.5)
Beta agonists	salbutamol	MDI	4	(3.3)	1	(0.8)	5	(4.1)	3	(2.5)	0		3	(2.5)
Leukotriene modifiers	Montelukast	Tablet	36	(30)	9	(7.5)	45	(37.5)	7	(5.8)	2	(1.6)	9	(7.5)
Methyl xanthanes	Theophylline	Tablet	86	(7.16)	5	(4.1)	91	(0.7)	30	(25)	4	(3.3)	34	(28.3)
Mucolytics	Guaifenesin	Syrup	2	(1.6)	4	(3.3)	6	(5)	5	(4.1)	2	(1.6)	7	(5.8)
Antihistamine	Cetirizine	Tablet	12	(10)	1	(0.8)	13	(10.8)	2	(1.6)	1	(0.8)	3	(2.5)
Anticholinergics	Ipratropium bromide	MDI	17	(14.1)	0		17	(14.1)	10	(8.3)	2	(1.6)	12	(10)
		MDI+SPACER	5	(4.1)	3	(2.5)	8	(6.6)	14	(11.6)	1	(0.8)	15	(12.5)

In our study populace, about 10.8% asthmatics and 20% COPD patients were prescribed with budesonide MDI. About 10% of asthmatics and 9.1 COPD patients have been endorsed with budesonide MDI+ spacer. About 4.1% of asthmatics and 2.5% of COPD patients were endorsed salbutamol MDI. About 17% of asthmatics and 10% COPD patients were prescribed with MDI ipratropium and 8% asthmatics and 12.5% COPD patients were endorsed with ipratropium MDI+spacer.table2

Table 3: Study of inhalers adherence among the study population

Type of inhalers	Dose recommended per day	Asthma (adherence %)		COPD (Adherence %)	
		Male (%)	Female (%)	Male (%)	Female (%)
Budesonide MDI	0.5-1mg 2times	(80)	(80)	(86)	(55)
Ipratropium bromide MDI	34mcg 4 times	(52.9)	(26.4)	(58.6)	(56.1)
O2 inhaler MDI	1 puff	(100)	(96)	(94)	(100)
Salbutamol MDI	180-216mcg	(92.5)	(86.3)	(95)	(91.2)
Salmeterol MDI	50-250mg 2 times	(90)	(89.7)	(98.2)	(93.6)
Budesonide MDI+ spacer	0.5mg 2 times	(76.7)	(83.4)	(86)	(84.9)
Ipratropium bromide MDI+ spacer	34mcg 4 times	(54.8)	(56.1)	(48.3)	(33.6)
salbutamol MDI+ spacer	180-216mcg	(95.6)	(93.8)	(91.6)	(96.1)

In our study adherence to inhaler therapy was evaluated by utilizing the equation correct dose/incorrect dose\*100 and coming up next were the adherence % for the inhaler drugs budesonide mdi80% among both male and female asthmatics 86% male and 55% females were endorsed with budesonide MDI among COPD. 76.7% of male and 83.4% of female asthmatics are endorsed with budesonide MDI+ spacer 86% of male and 84.9% of females COPD patients are prescribed with MDI+ spacer. table 3

Table 4: Self-reported reasons for non-adherence to inhalers

Reasons	Number of patients	(%)
High cost of medication	8	(6.6)
Lack of access to the hospital drug store	1	(0.8)
Fear of side effects	5	(4.1)
Felt better and stopped	12	(10)
Nonbeneficial	0	
Forgotten/occupational problems	2	(1.6)
Lack of family support/motivation	4	(3.3)
Fear of becoming dependent on treatment	6	(5)

The reasons for non-adherence were noted where 6.6% were not a follower because of significant expense of medication 0.8% because of the absence of admittance to clinic pharmacy, 4.1% because of dread of results, 10% felt much improved and halted, 1.6% neglected/word related problems, 3.3% absence of family support, 5% didn't cling because of dread of getting reliant upon treatment. table 4

Adherence to the drug in COPD is vital for advancing clinical results, and nonadherence brings about significant health and financial weight. Imperfect adherence is basic among COPD patients and results from a complex transaction of prescription, patient, and supplier factors. Adherence could be improved by utilizing worked-on treatment regimens, increasing patient knowledge about self-management, and upgrading supplier abilities in patient education, communication, and adherence advising. The challenge of adherence is determining acceptable levels of adherence and simple, but reliable devices to measure adherence. Given the various inhalers accessible to treat COPD, electronic screens to assess these drugs have not at this point been developed. Clinical preliminaries utilizing electronic checking, along these lines, should be

directed to examine the achievability of adherence interventions, their impacts on clinical results, and the solidness of results<sup>10, 12</sup>.

In our study adherence to inhaler therapy was evaluated by utilizing the equation correct dose/incorrect dose\*100 and coming up next were the adherence % for the inhaler drugs budesonide mdi80% among both male and female asthmatics 86% guys and 55% females were endorsed with budesonide MDI among COPD. 76.7% male and 83.4% of female asthmatics are endorsed with budesonide mdi+spacer 86% male and 84.9% females COPD patients are prescribed with mdi+spacer(Table 5). In a review study by thamby SA et al. on drug utilization pattern in asthmatics, it is seen that the study zeroed in on both smoker and nonsmoker asthmatics. It was seen that salbutamol was most generally prescribed, trailed by montelukast and prednisolone. In the combination therapy, the most regularly prescribed was Symbicort, trailed by Seretide and Combivent. Corticosteroids comprised the most predominant class, trailed by beta-2 agonists, leukotriene modifiers, and methylxanthines. The study introduced the latest situation on drug utilization pattern of asthmatics in Kedah state<sup>11</sup>.

The reasons for non-adherence were noted where 6.6% were not disciple because of significant expense of medication 0.8% because of the absence of admittance to emergency clinic pharmacy, 4.1% because of dread of results, 10% felt much improved and halted, 1.6% neglected/word related problems, 3.3% absence of family support, 5% didn't hold fast because of dread of getting dependent on treatment (Table 6). In a similar study by Fugate AR on medication adherence in COPD and asthma patients, it was found that The major reported reasons to stop/miss medication were felt better and stopped (64.81%) because asthma and COPD have symptomatic treatment, so whenever feel better they stop the medicine, so whenever feel better they stop the medicine, forgetfulness (55.55%), expensive (42.59%) and lack of access to drug store/hospital (31.48%). Other minor reasons were lack of family support/Motivation, fear of side effects, feel nonbeneficial. The same reasons were reported in the previous studies<sup>9</sup>.

Table 5: Assessment of information on inhaler use in examination asthma and COPD patients before pharmacist intervention

No. of patients preferred correctly						
Questionnaire	Male (n=96)	(%)	Female (n=24)	(%)	Total	(%)
Shake vigorously	88	(73.3)	17	(14.1)	105	(90.8)
Remove cap	92	(76.6)	19	(15.8)	111	(92.5)
Hold upright	95	(79.1)	17	(14.1)	112	(93.3)
Breathe out gently	86	(71.6)	16	(13.3)	102	(85)
Start breathing in slowly and deeply	77	(64.1)	16	(13.3)	93	(77.5)
Actuate during inspiration	89	(74.1)	20	(16.6)	109	(90.8)
Continue slow inhalation	89	(74.1)	19	(15.8)	108	(90)
Release in spacer and inhale	85	(70.8)	19	(15.8)	104	(86.6)
No aerosol loss is visible	82	(68.3)	19	(15.8)	101	(84.1)
Hold breath for 10 seconds	78	(65)	15	(12.5)	93	(77.5)
Next dose after 1 minute	89	(74.1)	17	(14.1)	106	(88.3)
^ Rinse out mouth after using	22	(18.3)	7	(5.8)	29	(24.1)

Table 6: Assessment of information on inhaler use in examination asthma and COPD patients after pharmacist intervention

No. of patients preferred correctly						
Questionnaire	Male (n=96)	(%)	Female (n=24)	(%)	Total	(%)
Shake vigorously	97	(80.8)	22	(18.3)	119	(99.1)
Remove cap	97	(80.8)	23	(19.1)	120	(100)
Hold upright	94	(78.3)	23	(19.1)	117	(97.5)
Breathe out gently	95	(79.1)	23	(19.1)	118	(98.3)
Start breathing in slowly and deeply	91	(75.8)	21	(17.5)	112	(93.3)
Actuate during inspiration	95	(79.1)	19	(15.8)	114	(95)
Continue slow inhalation	94	(78.3)	23	(19.1)	117	(97.5)
Release in spacer and inhale	92	(76.6)	22	(18.3)	114	(95)
No aerosol loss is visible	88	(73.3)	20	(16.6)	108	(90)
Hold breath for 10 seconds	90	(75)	21	(17.5)	111	(92.5)
Next dose after 1 minute	95	(79.1)	22	(18.3)	117	(97.5)
^ Rinse out mouth after using	39	(32.5)	11	(9.1)	50	(41.6)

**CONCLUSION**

The present outcomes feature the requirement for pharmacist interventions pointed toward improving adherence to inhalers in COPD and asthmatic patients. By and large drug adherence and inhaler technique improvement were discovered to be measurably significant in asthma and COPD patients in the wake of directing by a pharmacist. The huge reasons for medication rebelliousness were felt good and halted, the significant expense of medication, absent-mindedness, and absence of admittance to pharmacy/emergency clinic.

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