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### IMPACT OF PERIODIC COUNSELLING ON- “APPROPRIATE USAGE OF INHALERS IN THE TREATMENT OF RESPIRATORY DISEASES AND ADVERSE EFFECTS MANAGEMENT”; A CLINICAL PHARMACIST INITIATIVE-OBSERVATIONAL STUDY

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#### ABSTRACT

**Background:** Respiratory diseases remain as a cause of frequent visit of emergency department and hospital admission. Inappropriate usage of inhalers and lack of patient counselling leads to uncontrolled state. Proper education and monitoring can manage the disease as well as ADRs. **Aim:** To study the impact of pharmacist counselling on appropriate usage of inhalers in the treatment of respiratory diseases and their ADR management. **Materials and methods:** Patients with respiratory diseases, who are using inhalers are recruited in this observational follow-up based study done in a tertiary care hospital in TamilNadu. Baseline data was collected by data acquisition form and case sheet analysis. 4 follow-ups were done in every 1 month interval, after detailed counselling of the subjects. The data were compared with t-test and Z- test. **Results:** Out of 105 subjects, most of the subjects were counselled by pharmacist(61.9%) than physician (26.66%). The percentage error in inhaler usage was 83.8% in baseline which falls to 27.6% in 4<sup>th</sup> follow up(p=0.001). In baseline, 85.7% subjects were of score <15 (poorly controlled), but in 4<sup>th</sup> follow up 83.8% were of score 19-22(well controlled), which is an impact of appropriate usage of inhalers. **Conclusion:** This study clearly highlighted that inappropriate usage of inhalers is associated with uncontrolled respiratory diseases and frequent ED visits. The periodic pharmacist counselling leads to controlled disease and ADR management, shows the active role of pharmacist on the topic.

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## INTRODUCTION

The lung is a vital internal organ which is most vulnerable to infection and injury from an external environment because it has constant exposure to particles, chemicals and organisms in ambient air. Respiratory diseases are leading causes of morbidity and mortality worldwide. About 65 million people suffer from chronic obstructive pulmonary disease (COPD) and from this, 3 million die in each year. About 334 million suffer from asthma, the most common chronic disease of childhood affecting 40% of children globally. Pneumonia cause death of millions of people annually. Over 10 million people develop tuberculosis (Tb) and 1.4 million die from it each year, making it the most common lethal infectious disease. Lung cancer kills 1.6 million people each year and is the most deadly cancer. Globally, 4 million people die prematurely from chronic respiratory disease. At least 2 billion people are exposed to indoor toxic smoke, 1 billion inhale outdoor pollutant air and 1 billion to tobacco smoke.[1].

Respiratory diseases make up five of the 30 most common causes of death. COPD is third; lower respiratory tract infection is fourth; tracheal bronchial and lung cancer is sixth; Tb is twelfth; and asthma is twenty eighth. [2] Altogether more than 1 billion people suffer from either acute or chronic respiratory conditions.[3].

Patient counselling deals with providing information to the patients regarding their disease, medications, and life-style modifications in simple layman's language. It may be defined as providing medication information orally or in written form to the patients or to their representative. [4] The outcomes of effective patient counselling are as follows: The patients recognize the importance of medication for their wellbeing; encouragement to patients to establish a working relationship with the pharmacist and foundation for continual interaction with, and consultation from, the pharmacist; improvement in the coping strategies of patients to deal with medications side effects and drug interactions; the patients are motivated to take their inhalers properly for improvement of their health status; development of ability in patients to make appropriate medication-related decisions concerning adherence to their medications; and the patients become informed, efficient and active participants in disease treatment and health care management. [5].

Inhaled drugs place a vital role in the management of asthma as well as COPD. Appropriate usage of inhaler and other inhaling equipments can improve the disease status in most of the respiratory diseases. The patients should aware of their medical status, disease state, medications, proper administration and its adherence from the time of diagnosis. Patient counselling should lead to increased patient confidence in the ability to manage respiratory diseases on their own, decrease hospital admission rate and emergency visits, increase adherence to treatment and improve the quality of life. [6].

Advanced technologies are improving to its peak in the field of health care nowadays. Today, there are many devices available for administration of inhaled medication in desired quantities at required site. However, usually the patients are unaware about the usage pattern of these devices. Incorrect or inappropriate usage of these inhalation devices is associated with poor or uncontrolled management of respiratory diseases, which causes therapeutic failure. Socio-economic status, literacy rate and lack of interest are commonly seen as the reason of undesired therapeutic outcome. So there is a need of pharmacist initiative patient counselling in current scenario for a promising therapeutic outcome and improving patient quality of life. The objective of our study is to understand impact of appropriate usage of inhalers in the management of respiratory diseases, the effectiveness of pharmacist periodic counselling in the adverse effect management, to study the barriers in proper usage of inhalers, to make people aware about role of inhalers.

## MATERIALS AND METHODS

This study is multi-centered, observational follow up based study done in two tertiary care hospitals in Tamil Nadu by the continuous follow up for 6 months.

105 patients with respiratory diseases from the age of 5-60 years old were recruited in the trial. Participants should be signed on a written informed consent and eligible ones received face-to-face counselling of clinical pharmacist with demonstration regarding appropriate usage of inhaling devices and management of adverse effects, immediately after recruitment and continued in 30 days intervals for 6 months. The study started only after all participants got a clear idea about their disease state, usage pattern and adverse effects of inhalers and their prevention.

The baseline data collection was done by questionnaire prepared and case sheet analysis. The follow up will be done every 30 days interval for 6 months by using the follow up sheet. A daily self-assessment card was provided to the participant and one copy was maintained by the interviewer during all follow ups, for most accurate data collection. The follow up was done by the means of hospital visits and phone calls.

Notices, brochures, leaflets and the helpline details was provided to all the participants and displayed in the hospital also. All the measurements and details at the baseline, counselling and follow ups was noted down by the interviewer.

**RESULTS****PATIENT DEMOGRAPHICS**

Out of 105 population, the <15 years subjects were 4.7% (5). The 15-24 years ages were 9.5% (10). Among them 8.6% (9), 11.4% (12), 21.0% (22) and 44.8% (47) were in the age brackets of 25-34, 35-44, 45-54 and 55-64 respectively. The mean age of them was  $46.1 \pm 15.3$  years with a range of 6-60 years.

51.4% (54) were male and 48.6% (51) were female patients.

Various studies consistently showed that using of inhaler was associated with educational level. For instance, there is a positive correlation between level of education and using of inhalers. The illiterates were 31.4% (33). The primary school level was 36.2% (38). The secondary studied subjects were 18.1% (19) and graduated subjects were 14.3% (15).

Occupation decided the disease severity as well as the amount of earning potential of the study population. Among the study population, highest number of patients who were using inhalers falls under self-employees and housewife which is 28 (26.66%), followed by employees were 19 (18.09%), student were 15 (14.28%), 11 (10.47%) were not going for work and least come under professionals were 4 (3.80%).

The Smoking status shows that 18.09% (19) patients were smoker, 14.28% (15) were ex-smoker, 6.66% (7) were second hand smokers and 60.97% (64) patients were non-smokers.

Genetics plays an important causative role in respiratory diseases. The study shows that 25.71% (27) patients relatives using inhalers.

**Table 1: PATIENT DEMOGRAPHIC (N=105):**

Description	No. of patients	Percentage (%)
<b>Sex</b>		
Male	54	51.4
Female	51	48.6
<b>Age group</b>		
6-15	5	4.7
15-24	10	9.5
25-34	9	8.6
35-44	12	11.4
45-54	22	21
55-60	47	44.8
<b>Level of education</b>		
Degree	15	31.4
Secondary	19	36.4
Primary	38	18.1
Illiterate	33	14.3
<b>Work</b>		
Professional	4	3.8
Employee	19	18.09
Housewife	28	26.66
Self-employed	28	26.66
Student	15	14.28
Unemployed	11	10.47
<b>Smoking</b>		
Smoker	19	18.09
Ex-smoker	15	14.28
Second hand smoker	7	6.66
None	64	60.97
<b>Have relative using inhaler</b>		
Yes	27	25.71
No	78	74.28

**DESCRIPTION OF DIAGNOSIS IN STUDY SUBJECTS**

Among 105 population, most of the cases were Bronchial Asthma which is 61.0% (64) followed by COPD 28.5% (30), Bronchiectasis 5.6% (6), Cough variant asthma 1.9% (2), Atopic Asthma 1.0% (1), Infective Exacerbation 1.0% (1) and Type 2 respiratory failure 1.0% (1).

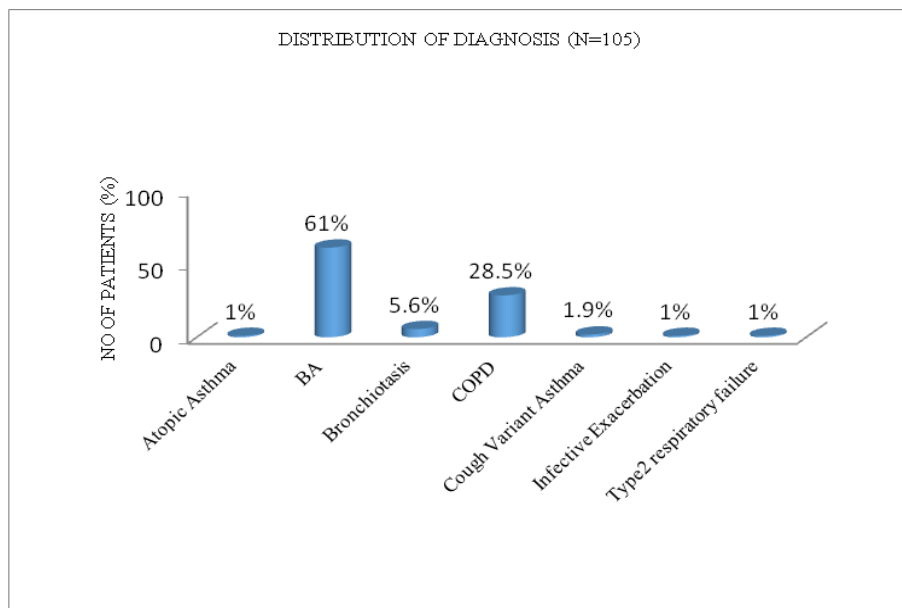


Figure 1:

### PATIENT CHARACTERISTICS RELATED TO USE OF INHALERS

MDI is the type of inhaler mostly used in the study 46.66% (49) followed by DPI 38.09% (40) and MDI with spacer 15.23% (16). The study conducted by Andrea et al shows that 63.3% patients used with DPIs.

The highest no of duration of inhaler use is <1years is 58.09% (61) whereas the least is >10years is 1.09% (2).

Knowing the importance of inhaler usage is considered as the heart of the study. About 54.28% (57) of patients doesn't know the importance of inhaler usage and only 45.71% (48) knows about the importance.

61.90%(65) patient counseling had done by pharmacist followed by 26.66%(28) by physicians and 11.42%(12) by others.

As most of the patient counseling had done by pharmacists and physicians there is 89.52%(94) patients were given with precaution regarding oral hygiene whereas only 10.47%(11) were not given.

**Table 2: PATIENT CHARACTERISTICS RELATED TO USE OF INHALERS (N=105).**

Description	Number of Patient	Percentage to total (%)
Type of inhaler used		
MDI	49	46.66%
DPI	40	38.09%
MDI WITH SPACER	16	15.23%
Duration of use of inhaler		
<1 year	61	58.09%
1-5years	35	33.33%
6-10 years	7	6.66%
>10 years	2	1.90%
Knowing importance of inhaler		
Yes	48	45.71%
No	57	54.28%
Taught by		
Pharmacist	65	61.90%
Physician	28	26.66%
Others	12	11.42%
Precautions given		
Yes	93	88.6%
No	12	11.4%

### PERCENTAGE ERROR IN MDI USAGE (N=49)

Out of 105 patients, 49 were using with MDI. No or short (less than 2-3 s) breath-holding after inhalation 77.55% (38) followed by 75.51% (37) forceful inhalation and 73.46% (36) no exhalation before actuation, which are the incorrect steps done by most of the patients. After periodic counselling the above %error were reduced to 42.85% (2), 26.53% (13) and 51.02% (25) respectively.

Table 3: Percentage error in MDI usage:

SL.NO	Checklist of MDI inhalation technique errors	Baseline		Follow up 4	
		Frequency (N=218)	Percentage Error (%)	Frequency (54)	Percentage Error (%)
2	Not shaking the inhaler	28	12.88	3	5.56
3	No exhalation before actuation	36	16.90	25	46.30
4	Not holding the inhaler in the upright position	17	7.79	1	1.85
5	More actuations for a single inhalation	23	10.80	5	9.26
6	Actuation against teeth, lips, or tongue	5	2.49	0	0
7a	Actuation in the second half of inspiration	12	5.50	2	3.70
b	Activation after end of inhalation	4	1.53	1	1.85
8a	Stopping inhalation immediately after firing	14	6.58	1	1.85
b	Forceful inhalation	37	16.97	13	24.08
9	Inhalation through nose whilst and after actuation	4	1.13	1	1.85
10	No or short (less than 2-3 s) breath-holding after inhalation	38	17.43	2	3.70

**PERCENTAGE ERROR IN MDI WITH SPACER USAGE**

Out of 105 patients, 16 were using with MDI with spacer. No or short (less than 2-3 s) breath-holding after inhalation 93.75% (15) followed by 56.25% (9) not shaking the inhaler and do not continue to inhale until the lungs are full 56.25% (9), which are the incorrect steps done by most of the patients. After periodic counselling the above %error were reduced to 12.50% (2), 12.50% (2) and 12.50% (2) respectively.

Table 4: Percentage error in MDI with spacer usage:

SL.NO	Checklist of MDI with spacer inhalation technique errors	Baseline		Follow up 4	
		Frequency (N=57)	Percentage error (%)	Frequency (15)	Percentage error (%)
1	Failure to remove cap	0	0	0	0
2	Not shaking the inhaler	9	15.78	2	13.33
3	Failure to fit the inhaler into the opening at the end of the spacer	0	0	0	0
4	Do not breathe out properly	8	14.04	2	13.33
5	Actuation against teeth, lips, or tongue	4	7.02	1	6.67
6	Failure to trigger the inhaler while breathing in slowly and deeply	12	21.05	5	33.34
7	Do not continue to inhale until the lungs are full	9	15.78	3	20
8	Not removing spacer from the mouth properly	0	0	0	0
9	No or short (less than 2e3 s) breath-holding after inhalation	15	26.32	2	13.33

### PERCENTAGE ERROR IN DPI USAGE

Out of 105 patients, 40 were using with DPI. Stopping inhaling prematurely (not inhaling to TLC) 67.5% (27) followed by 57.7% (23) slow and not forceful inhalation and 47.5% (19) do not control whether some powder drug rests into the capsule after inhalation, which are the incorrect steps done by most of the patients. After periodic counselling the above %error were reduced to 35% (14), 15% (6) and 5% (2) respectively.

**Table 5: Percentage error in DPI usage:**

Sl.NO	Checklist of DPI inhalation technique errors	BASELINE		Follow up 4	
		Frequency (N=152)	Percentage error (%)	Frequency (N=40)	Percentage error (%)
1	Failure to open the device	2	1.32	0	0
2	Failure to insert the capsule	10	6.58	0	0
3	Failure to pierce the capsule	14	9.21	2	5
4	Incorrect dose loading	0	0	0	0
5	Keep the inhaler inclined no more than 45 from the vertical axis during loading	5	3.29	1	2.5
6	Exhaling into the device mouthpiece after loading	15	9.87	2	5
7	Stopping inhaling prematurely (not inhaling to TLC)	27	17.76	14	35
8	Inhaling by nose	2	1.32	0	0
9	Not sealing lips around mouthpiece during inhalation	11	7.24	1	2.5
10	Slow and not forceful inhalation	23	15.13	6	15
11	Exhaling into the device mouthpiece after inhalation	13	8.54	5	12.5
12	No breath-holding after inhalation	11	7.24	7	17.5
13	Do not control whether some powder drug rests into the capsule after inhalation	19	12.5	2	5

### COMPARISON OF CORRECT USAGE OF INHALER AT BASELINE AND AT 4<sup>TH</sup> VISIT

The below table compares the correct usage of the inhalers at baseline and 4<sup>th</sup> visit. The correct usage of MDI inhaler at baseline was 12.2% and at 4<sup>th</sup> visit was 73.5%. The correct usage between baseline and 4<sup>th</sup> visit was statistically very highly significant (P<0.001). The correct usage of DPI inhaler at baseline and 4<sup>th</sup> visit were 10% and 70%. The correct usage between baseline and 4<sup>th</sup> visit was statistically very highly significant (P<0.001). The MDI spacer inhaler correct usage at baseline was 43.8% and 4<sup>th</sup> visit was 75.0%. The correct usage between baseline and 4<sup>th</sup> visit was statistically very significant (P<0.001). The correct usage of total score at baseline was 16.2% and 4<sup>th</sup> visit was 72.4%. The correct usage of baseline and 4<sup>th</sup> visit was statistically very highly significant (P<0.001).

**Table 6: Comparison of correct usage of inhaler at baseline and at 4<sup>th</sup> visit (N=105):**

INHALER	NO.	BASELINE				4 <sup>TH</sup> VISIT				"Z"	SIG
		Correct		Incorrect		Correct		Incorrect			
		No	%	No	%	No	%	No	%		
MDI	49	6	12.2	43	87.8	36	73.5	13	26.5	7.810	P<0.001
DPI	40	4	10.0	36	90.0	28	70.0	12	30.0	6.928	P<0.001
MDI(Spacer)	16	7	43.8	9	56.2	12	75.0	4	25.0	6.895	P<0.001
Total	105	17	16.2	88	83.8	76	72.4	29	27.6	9.941	P<0.001

### HOSPITAL ADMISSIONS

Comparing the data of both baseline and 4<sup>th</sup> follow up the percentage of hospital admission had reduced. At baseline 62.85% (66) patients never admitted to the hospital followed by 22.85% (24) for 1 time, 9.52% (10) for 2-3 times and 4.76% (5) for more than 3 times where as in 4<sup>th</sup> follow up 97.14% (102) of patients never admitted to the hospital followed by 1.19% (2) for 1 time, 1.0% (1) for 2-3 times and nobody admitted for more than 3 times.



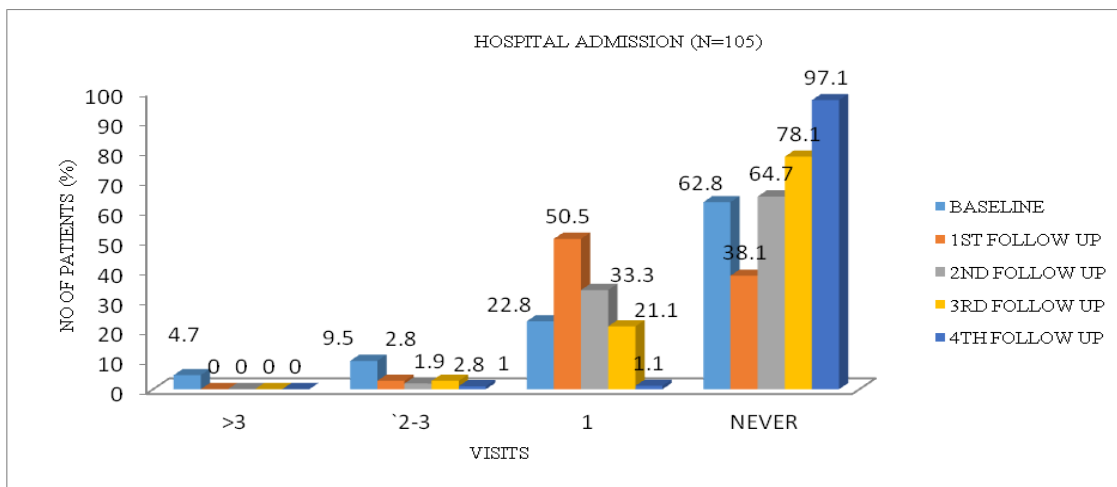


Figure 2:

**EMERGENCY VISIT IN THE HOSPITAL**

On comparing each follow up data and baseline data the visit to emergency department had reduced. In baseline, patient visited hospital one time was 49.52% (52) followed by never visited was 21.9% (23), visited 2-3 times was 4.76% (5) and visited more than 3 times was 4.76% (5). On appropriate inhaler technique 86.66% (91) of patients never visited to hospital on emergency followed by 16.19% (17) for 1 time, 1.9% (2) for more than 3 visits.

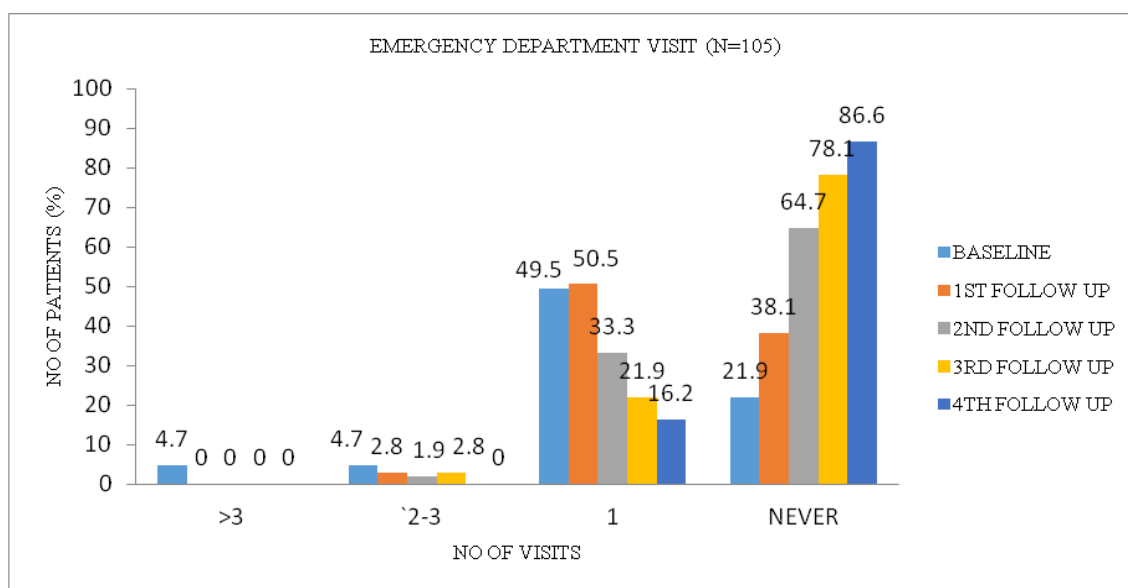


Figure 3:

**COMPARING IMPACT OF PERIODIC COUNSELLING FROM BASELINE TO 4<sup>TH</sup> FOLLOW UP**

The table-7 states the impact of counselling from baseline to 4<sup>th</sup> visit. The score of slow down or stop down activities at baseline mean was 2.2±0.9 and the same was increased at 4<sup>th</sup> visit as 4.0±0.4. The mean improvement was 1.8±0.8 with statistically very highly significant (P<0.001). The mean score of wheezing or chest tightness or cough at baseline was 2.1±0.8 and at 4<sup>th</sup> visit was 3.9±0.4. The mean improvement 1.8±0.8 was statistically very highly significant (P<0.001). The mean score night wake up at baseline was 2.0± 0.7 and at 4<sup>th</sup> visit was 3.8±0.5. The mean improvement 1.8±0.6 was statistically very highly significant (p<0.001). The mean score of missing dose of therapy at baseline was 2.1±1.6 and at 4<sup>th</sup> visit was 4.0±0.6. The improvement of missing dose 1.9±1.6 was statistically very highly significant (P<0.001). The mean score of asthma control rate at baseline was 2.0±1.5 and at 4<sup>th</sup> visit was 4.1±0.5. The mean improvement 2.0±1.5 was statistically very highly significant (P<0.001). The total mean score at baseline was 10.4 ± 3.7 and at 4<sup>th</sup> visit was 19.7±1.4. The mean improvement 9.3±3.6 was statistically very highly significant (P<0.001).

**Table 7: Impact of periodic counselling from baseline to 4<sup>th</sup> follow up:**

Counseling on	Base line		4 <sup>th</sup> visit		Improvements		“t”	df	Sig (P value)
	Mean	SD	Mean	SD	Mean	SD			
Stopping of activities	2.2	0.9	4.0	0.4	1.8	0.8	22.364	104	0.001
Wheezing, Chest Tightness or cough	2.1	0.8	3.9	0.4	1.8	0.8	22.791	104	0.001
Sleep disturbance	2.0	0.7	3.8	0.5	1.8	0.6	29.551	104	0.001
Missing dose	2.1	1.6	4.0	0.6	1.9	1.6	11.539	104	0.001
Rate of Respiratory disease control	2.0	1.5	4.1	0.5	2.0	1.5	14.272	104	0.001
Total score	10.4	3.7	19.7	1.4	9.3	3.6	26.683	104	0.001

## DISCUSSION

In this study, we tried to find out the impact of appropriate use of inhaler technique by:-

(1) correcting the incorrect steps done by the patients while handling the inhaler.

(2) scoring the patients satisfactory rate on each follow up visits and management of adverse effects on long term use of inhaler; by periodic patient education.

Majority (61.86%) of the patients were using MDIs rather than DPIs (38.09%), where Andrea Hammerlein, *et al*, reports that 63.3% patient population uses with DPI. Device should be selected based on a patient's acceptance and preferences. Selecting a device based on the patient's preference is cost effective in the long term, even if the device is more expensive than the standard devices. However, studies have shown that good educational practices results in the proper use of MDI which will be more cost effective in long-term. Inhaler training that includes, patients demonstration on inhaler technique to their physicians, pharmacists or other health care professionals is not yet conducted in everyday practice. Patients who showed incorrect inhaler technique were more in our study. No or short (less than 2-3s) breath-holding after inhalation was the incorrect step done by most of the patients using MDI (36.19%) and MDI with spacer (14.28%), where Andrea S Melani et al., reports that No or short (less than 2-3 s) breath-holding after inhalation (53%) is the most incorrect step done. Stopping inhaling prematurely (not inhaling to TLC) was the incorrect step done by most of the DPI patients (25.71%). Margarida Branco et al., shows that 68.0% of the patients done No breath-holding after inhalation (10s) was the incorrect step done. After a periodic patient education, on proper inhaler technique it was noticed that the percentage error become reduced to 1.90%, 1.90% and 13.33% for MDI usage, MDI with spacer usage and DPI usage respectively. The educational intervention by pharmacist resulted in improved inhaler technique at the end of each follow up sessions. Adverse effects of inhalation therapy can lead to deleterious consequences in the absence of intervention. Studies (Navneet Godara et al) have shown that inhaled drugs used in the treatment have some adverse effects on the oral health based on their dosage, frequency and duration of use. Our study depicts the adverse effects on prolonged usage of inhalers. The whole total of 19.01% of adverse effect was reported. The highly reported adverse effect was taste change (4.76%). And there is no studies found, which showing the rate of management of adverse effects.

## CONCLUSION

Inappropriate inhaler technique and all of its consequences associated with lack of proper patient education can lead to uncontrollable respiratory disease with poor outcome. It can cause adverse effects, which leads to deleterious consequences in the absence of intervention. So periodic patient education is very necessary to improve the quality of life of patients. Aim of our study was to provide periodic counselling on appropriate inhaler techniques and its adverse effect management. The result shows that clinical pharmacist can play a vital role in disease control and adverse effect management which is inevitable.

## LIST OF ABBREVIATION

COPD - Chronic Obstructive Pulmonary Disease  
 TB - Tuberculosis  
 MDI - Metered Dose Inhaler  
 DPI - Dry Powder Inhaler  
 TLC - Total Lung Capacity

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**REFERENCES**

1. The\_Global\_Impact\_of\_Respiratory\_Disease.pdfhttp://www.who.int/gard/publications/
2. GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016; 388: 1459–154.
3. Global Status Report on Non-communicable Diseases 2014. Geneva, World Health Organization, 2014.
4. Anupa KC, Durga B, Subish P, Mishra P. Patient counseling by pharmacists: A novel approach to enhance patient compliance. *J Nep Pharm Assoc* 2005;23:17-22.
5. Ramesh A. Patient counseling. In proceedings: National seminar on advances in industrial pharmacy and pharmacy practice 1999, 17th-18<sup>th</sup> Oct. JSS College of Pharmacy: Mysore, India.
6. Gibbs KP, Small M. Asthma. In: Walker R, Edwards C, editors. *Clinical pharmacy and therapeutics*. 3rd ed. Churchill Livingstone: Philadelphia;2003. p. 375-95.



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