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A COMMUNITY BASED INTERVENTIONAL STUDY TO ASSESS ADHERENCE OF ASTHMA INHALER IN DAKSHINA KANNADA

Viresh K. Chandur[1], Nagaratna S. Moger[2]*, Satish S.[3] and A. R. Shabaraya[4]

[1,3]Professor, Department of Pharmacy Practice, Srinivas College of Pharmacy, Mangaluru, Karnataka, India – 574143.

*[2]PharmD Student, Department of Pharmacy Practice, Srinivas College of Pharmacy, Mangaluru, Karnataka, India – 574143.

[4]Principal, Department of Pharmacy Practice, Srinivas College of Pharmacy, Mangaluru, Karnataka, India – 574143.

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***Corresponding Author**
Nagaratna S. Moger
PharmD Student,
Department of Pharmacy Practice, Srinivas College of Pharmacy, Mangaluru, Karnataka, India – 574143.

ABSTRACT

Asthma is mainly treated with inhaled medications and the effectiveness of inhaler treatment depends on various factors, but primarily on proper inhaler technique and adherence to therapy. The TAI questionnaire can identify nonadherence and assess inhaler use barriers. The main aim of this study was to evaluate the impact of pharmacist intervention on inhaler adherence in patients with asthma. A total of 151 participants, aged 18 and above using inhalers were included in the study. From this, 106 non-adherent subjects were randomly allocated to control and intervention group, with 53 in each. Subject's adherence was evaluated with validated tool such as Test of Adherence to Inhalers (TAI) and Peak Expiratory Flow (PEF) at baseline and after 3 months. The intervention group received verbal counselling, inhaler technique demonstration and PIL and control group received no education. The intervention group significantly improved in all areas compared to control group, notably reducing inhaler forgetfulness (4.12 vs 3.81, $p < 0.001$), and increasing belief-driven adherence (4.21 vs 2.64, $p < 0.001$). However, adherence during periods of anxiety or sadness remained relatively stable, with only a minor decrease (4.13 vs 4.20, p=0.23). The intervention group demonstrated significantly higher adherence (54.72% vs 7.55%) and mean TAI score (47.60vs. 35.92, $p<0.001$) compared to controls. In conclusion, the study demonstrated positive impact of

pharmacist-led intervention on inhaler adherence among patients with asthma. Therefore, pharmacists could play an important role in reducing hospitalizations by improving inhaler adherence.

KEYWORDS: *Asthma, inhaler, adherence, TAI questionnaire.*

INTRODUCTION

Asthma is mainly treated with inhaled medications in several forms, primarily including dry powder inhalers (DPI) and metered-dose inhalers (MDI). When patients are prescribed an inhaled medicine, the choice of inhaler should, in part, be based on ease-of-use and on the ease with which a healthcare professional can teach correct technique.[1] Different medications, such as ICS, long-acting beta-2 agonists(LABA), or both alone or in combination are used for the management of asthma.[2] ICS are considered the backbone of and primary choice for long-term asthma control therapy.[3]

The efficacy of inhaler treatment is reliant upon various factors, although it is predominantly subject to a well-executed inhaler technique and therapy adherence. A precise inhaler technique is of utmost importance for the optimum delivery of drugs to the lungs while also avoiding local adverse effects, such as oropharyngeal candidiasis, and dysphonia, which may arise with the use of ICS.[4]

Noncompliance with inhaled pharmaceuticals results in suboptimal asthma control, escalated healthcare utilization and costs, and decreased health-related quality of life.[5] Improper inhaler usage is frequently linked with poor adherence. It is imperative to provide instruction for even the simplest of devices. The most effectual training method to teach the inhaler technique is verbal instruction combined with a physical demonstration.[6] Only 46-59% of patients with asthma perform efficient inhalation technique with currently used inhalers.[1]

Considering that more than 34 million adults in the India have asthma it is necessary to design a successful and long-lasting strategy that may be employed in practice settings since adherence to controller therapy remains continuously poor (<50%). Most common patient-related barriers to optimal adherence included lack of knowledge about the prescribed asthma medicine, followed by concern over side effects, inconvenience, misperception of the intermittent need for controller medications, misconceptions about asthma chronicity, and wavering about medication effectiveness.[7]

The Test of Adherence to Inhalers (TAI) is a validated questionnaire that can easily identify nonadherence and assess the barriers related to the use of inhalers and establish patterns of noncompliance which are useful for tailoring patient specific corrective measures. Studies have shown that over 25% of patients do not receive proper instructions on how to use inhalers. Thus, Pharmacists can readily educate the patient on proper inhalation techniques and play an important role in improving adherence as well as asthma control status.[8]

Objectives

To evaluate the impact of pharmacist intervention on inhaler adherence in patients with asthma.

MATERIALS AND METHODS

Study design: A community based interventional study was carried out to assess adherence to asthma in different regions of Dakshina Kannada.

Study duration: The study was conducted for a duration of 6 months from March 2023 – August 2023.

Sample size: The sample taken for the study was 151.[7]

Study criteria

Inclusion criteria

- Patients aged 18 years or above, of both genders (male and female).
- Patients clinically diagnosed with asthma and prescribed inhalers for continuous use.
- Participants willing to participate in the study.

Exclusion criteria

- Patients terminally ill, bedridden unconscious, not willing to participate.

Source of data: Data(s) were collected using data collection form through direct interaction with the study subjects at their residences. The current study included asthma patients on inhaler treatment.

Study period: The study period was divided into 3 phases:

Phase 1

(A) Preparation for the study

- The data collection forms were prepared which included patient name, gender, age, and height. Adherence to treatment was assessed using a validated TAI questionnaire.
- Inform consent form were prepared in English and Kannada and same were used before selection of subjects.

(B) Institutional ethics committee approval

Ethical Clearance was obtained from the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science and Research Centre (SIMS & RC), Mangaluru.

Phase 2

- **Patient selection:** The subjects for the study were selected based on the inclusion and exclusion criteria.
- **Obtaining inform consent:** During the home visit, the subjects were explained about the study and patient consent was obtained for collecting data. The data was collected by personal discussion with the patient.
- **Patient allocation:** Based on the TAI score patients were categorized according to adherence status, of which non-adherent participants (TAI<50) were randomly allocated to control group and Intervention group.
- **Providing intervention:** Intervention group received verbal counselling, inhaler technique demonstration, and a PIL while control group didn't receive any form of intervention.

Phase 3

- Patient review: After 3 months of the intervention, patients were followed up for review of their asthma inhaler adherence.
- The data collected were analyzed using Microsoft Excel and SPSS and all data were kept confidential.

Statistical analysis

Statistical analysis involves collecting and scrutinizing every data sample in a set of items from which samples were drawn and a suitable statistical test such as student T test and Chi

square test were applied. p-value of <0.05 are considered statistically significant. The collected data were analyzed using Microsoft excel and SPSS.

RESULTS

Demographic characteristics

A total of 151 subjects were recruited. The mean age was 49.06, and 50.65% were male. Only 29.8% had a peak flow meter, and 37.08% had visited the emergency department or hospital due to asthma symptoms in the last 3 months (Table 1).

Table 1: Demographics and management characteristics of patients.

Characteristics	All subjects N=151
Male	78(51.65)
Female	73(48.35)
Age in years	49.06±12.2
ED/Hospital visit due to asthma symptoms in past 3 months	56(37.08)
Possess a peak flow meter	45(29.8)

Continuous variables are expressed as Mean±SD and categorical variables are expressed as n (%), ED=Emergency Department.

Baseline Demographics and Clinical characteristics of patients in control vs intervention group

Present study utilizes the validated 10-item Test of Adherence to Inhaler (TAI) questionnaire (with a scale of 1–5). The TAI distinguishes good adherence (TAI= 50), intermediate adherence (TAI= 46–49), and poor adherence (TAI< 46).106(70.19%) non adherent subjects identified in the pre-test were eligible for the intervention phase of the study. They were randomly assigned to either the intervention group or the control group, with 53 patients in each group. Patients in both the intervention and control group had similar demographic characteristics, ED/Hospital visits, asthma control, inhaler adherence and technique at baseline (table 2).

Table 2: Grouping of patients based on clinical characteristics for intervention.

Characteristics	Control Group n=53	Intervention Group n=53	p-value
ED/Hospital visit use due to asthma symptoms in 3 months	25(47.16)	19(35.85)	0.65
10 item TAI score	35.28±18.1	33.43±17.6	0.66
% Predicted PEF	64.99±14.49	62.73±13.49	0.43

N=106. Categorical variables expressed as n(%) and continuous variables in Mean±SD.

Inhaler adherence in both groups post-test

Table 3 shows inhaler adherence in post-test (after 3 months) in the control group and intervention group. Higher scores indicate improved adherence. The intervention session took approximately 20–30 min. The intervention group significantly improved in all areas compared to control group, notably reducing inhaler forgetfulness (4.12 vs 3.81, $p < 0.001$), and increasing belief-driven adherence (4.21 vs 2.64, $p < 0.001$). However, adherence during periods of anxiety or sadness remained relatively stable, with only a minor decrease (4.13 vs 4.20, p=0.23).

Table 3: Mean scores of the individual barriers to inhaler adherence in post-test (TAI).

Test of adherence to inhalers	Control group[a]	Intervention group[a]	p-value
How often did you forget to take your regular in past 7 days?	3.81	4.12	<0.001
You forget to take your inhalers:	3.56	4.04	<0.001
When you are feeling well, you stop taking your inhalers:	3.51	4.17	<0.001
At the weekend/ on holiday, you stop taking your inhalers:	3.01	4.13	0.041
When you are anxious or sad, you stop taking your inhalers:	4.20	4.13	0.23
You stop taking your inhalers out of fear of potential side effects:	3.60	4.10	<0.001
You stop taking your inhalers because you believe that they are of little help in treating your condition:	2.64	4.21	<0.001
You take fewer inhalations than prescribed by your doctor:	2.98	4.23	<0.001
You stop taking your inhalers because you believe that they interfere with your day-to-day or work life:	3.68	4.17	<0.01
You stop taking your inhalers because you have trouble paying for them:	2.98	3.44	<0.01

[a] Five-point Likert scale -1 to 5

Pharmacist-led education significantly improved patient adherence. The intervention groupdemonstrated significantly higher adherence (54.72% vs 7.55%) and mean TAI score (47.60vs. 35.92, $p<0.001$) compared to controls. Overall, the intervention notably boosted inhaler adherence, highlighting the intervention's efficacy in promoting adherence (Table 4).

Table 4: Level of adherence to inhaler in both groups using TAI in post-test (N=106).

Category of adherence	Control group(n=53)		Intervention group(n=53)		
	n(%)	Mean±SD	n (%)	Mean±SD	p-value
Good Adherence	4(7.55)	35.92±12.2	29(54.72)	42.60 ± 12.5	<0.001
Intermediate Adherence	12(22.64)		9(16.98)		
Poor Adherence	37(69.81)		15(28.30)		

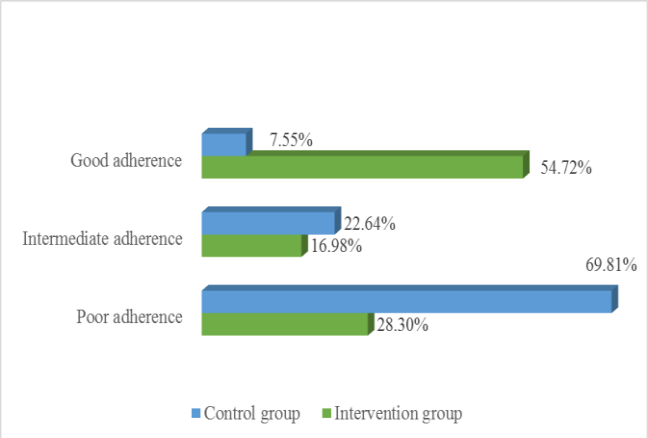

Fig. 1: Comparison of inhaler adherence in post-test.

DISCUSSION

Effectiveness of a pharmacist-led educational intervention to improve asthma inhaler adherence

Findings from the present study indicated that forgetfulness, treatment beliefs and costs were the most common barriers to patient-reported asthma controller adherence. Asthma patients with non-adherence demonstrated misperceptions and lack of knowledge regarding asthma inhalers which indicates that treatment beliefs are associated with problematic disease control. Higher cost of the inhalers not only decreases the adherence but also results in asthma related hospitalizations and emergency department visits. A study by Makhinova *et al.*, reported similar barriers to inhalers adherence, but very few patients experienced issues related to cost. The main reason for this deviation is that the majority of the patients were using an inhaler covered by their insurance, and therefore, had no issues affording it.[7]

The main result of the present study is that educational intervention is effective in improving therapy adherence, as assessed by the TAI score. A recent systematic review of the literature with meta-analysis synthesizing the results of 11 randomized studies concluded that pharmacist-led interventions can significantly improve medication adherence with a large size effect.[9]

The present study showed significant improvement in TAI score. Paoletti *et al.*, reported similar results when investigating the effects of pharmacist-led educational interventions on inhalation therapy adherence at baseline and follow-up. Through TAI-driven interventions, pharmacist can enhance treatment adherence and asthma control.[8] This insight highlights the critical role of educational interventions in achieving better compliance and disease control.

CONCLUSION

The study demonstrated positive impact of pharmacist-led intervention on inhaler adherence among patients with asthma. Therefore, pharmacists could play an important role in reducing hospitalizations by improving inhaler adherence. Furthermore, this relatively simple intervention strategy, could be easily incorporated into clinical management programs, offering a viable avenue for amplifying adherence levels.

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