

A Cross Sectional Study to Assess the Non-Adherence to Inhalational Medication in Bronchial Asthma Patient as Well as to See the Factors Responsible for Non-Adherence

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Aim: The objective of the present study was to assess the non-adherence to inhalational medication in bronchial asthma patient as well as to see the factors responsible for non-adherence.

Methods: The present study was conducted at Department of Geriatric Patna medical college and Hospital, Patna, Bihar, India for one year and 200 patients were included in the study who met inclusion criteria.

Results: A total of 200 asthmatic patients who meets the inclusion criteria were included in the study. Among the total of study participants, higher proportions of patients were female (58%). Most of the participants (45%) were in between 18 and 30 age group. Large number of the respondents, 120 (60%) were unable to read and write. A total of 19% patients had previous history of adverse drug reaction (ADR) to inhalational anti asthmatic medications. The mean (\pm standard deviation) duration of years living with the disease was 6.09 ± 3.13 ranging from 2 to 19 years. Respondents who were not taking inhaler education were found to be 20%, whereas 7% were smokers. Among the total participants, poly pharmacy was present in 30% of them. Regarding to co-morbidity, 40% of the participants has had at least one more disease in addition to asthma.

Conclusion: The rate of non-adherence is very high amongst the participants. Therefore promoting optimal medication adherences through education, proper counseling is essential to optimize the benefits of treatment.

Keywords: Non-Adherence, Inhalational Medication, Bronchial Asthma.

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Introduction

As defined by the World Health Organization (WHO) "bronchial asthma is a respiratory disorder, characterized by

recurrent attacks of breathlessness and wheezing, usually of allergic origin, which varies in severity from person to person". Asthma is a disease that is characterized

by the spontaneous occurrence of attacks of breathlessness and wheezing, usually at night. The condition occurs with varying severity over a period of several years and sometimes throughout life. With good management the symptoms may diminish and even disappear. [1-3]

Despite the availability of highly effective pharmacotherapy, poorly controlled asthma is reported in up to 70-95% of patients in developed and developing countries. Among other factors, poor compliance and knowledge of asthma medication and poor adherence towards regular control visits are explanations for this suboptimal control. Although, the most effective long-term control medicines available are inhaled corticosteroids, a recent national survey in USA showed that four out five people with chronic asthma are not using these medicines. Inadequate compliance with prescribed medication can lead to failure of treatment, excessive use of medication, unnecessary costs, life-threatening exacerbations, and ultimately death. [4,5]

Short-acting beta₂ agonists are the first line treatment for acute asthma symptoms and anticholinergic medications provide additional benefit when used in combination with Short acting beta₂ agonists. [6] Currently corticosteroids are the most effective treatment available for long-term control of asthma. Except in the case of severe persistent disease, I-inhaled forms of corticosteroids are usually used in the long term management. [7] Good level of adherence is the cornerstone in the long term management of asthma. In chronic asthmatic patients, non-adherence or inhaler mishandling increases mortality, morbidity, and hospital admission. [8,9]

The association between non-adherence and poor disease control is clearly stated in different literatures. Patient age, level of education/knowledge about the conditions, medication and lack of technical skill of delivery devices were taught to be the cause of nonadherence to inhaled

medications. [10-13] In addition to this, complexity of the inhalation regimen, peculiarities of inhaler devices, type of inhaled agent, and a variety of patient beliefs and sociocultural and psychological factors also the cause poor adherence to inhalational medications. [14] It is important to know that the rational use of inhaled medication improves the outcomes of chronic asthma managements. Among patients receiving long-term pharmacotherapy for chronic diseases, only 50% of them are adherent to treatment while adherence rates in asthma have been shown to vary widely from 22% to 78%. [15-18]

The objective of the present study was to assess the non-adherence rate to inhalational medication in bronchial asthma patient as well as to see the factors responsible for non-adherence.

Materials and Methods

The present study was conducted at Department of Geriatric Patna medical college and Hospital, Patna, Bihar, India for one year and 200 patients were included in the study who met inclusion criteria.

Data collection instrument

The data was collected using a tool called Test of Adherence to Inhalers (TAI), which is validated by PLAZA et al. [19] to assess the level of adherence to inhalers in asthma and COPD patients. TAI consists of both 10 and 12 item questions. The 10-items TAI was designed to identify non-adherent patients and to measure the non-adherence level, whereas the 12-items TAI was designed to guide clinically the non-adherence patterns. TAI scores 50, 46-49 and less than 45 was considered as adherent, intermediate adherent and nonadherent respectively. In the present study the 10 item TAI is used to measure the level of non-adherence. In addition to TAI tool, patients demographics and clinical data was collected. Poly pharmacy is operationally defined as-patients who

are taking more than four drugs and co-morbidity is considered if a patient has more than 1 confirmed diagnosis.

Patients' recruitment

Patients greater than 18 years of age and those who use inhaled medications for at least 2 years before enrolment were included in the study. Study participants were consecutively enrolled when they visit hospital outpatient pharmacy for refill. The data was collected by pharmacists who have been working in the outpatient pharmacy. TAI is self-compiled questionnaire but for patients who are unable to read and write, the data collectors helped them into the completion of the questionnaire through interview.

Data entry and analysis

The data was entered to and analyzed using IBM SPSS Statistics for Windows, version 20. Continuous variables were presented as mean \pm standard deviation. Categorical variables were expressed as frequencies and percentages. Association

between predictive variables (socio demographic and clinical data of patients) and dependent variables (non-adherence) using binary logistic regression was done to identify determinants of non-adherence. Variable with p value <0.20 were included in the multivariate model and P-value less than 0.05 and 95%, confidence interval (CI) were used as cut off points for determining statistical significance of associations among different variables.

Ethical consideration

Ethical approval was obtained from research and ethics review committee. Informed verbal consent was also obtained from each respondent after explaining the purpose of the study. They were also informed that participation was voluntary and they could withdraw from the study at any stage if they desired. Participant's confidentiality was guaranteed by not recording their personal identifiers on the questionnaire.

Results

Table 1: Socio-demographic characteristics

Patient characteristics and clinical data	N (%)
Total number of study population, N	200
Gender	
Male	84 (42)
Female	116 (58)
Age	
61–65, n (%)	90 (45)
66–70, n (%)	60 (30)
> 75, n (%)	50 (25)
Education level	
Unable to read and write, n (%)	120 (60)
Primary education, n (%)	38 (19)
Secondary education n (%)	36 (18)
Higher education, n (%)	6 (3)
CLINICAL DATA	
Previous history of ADR	
Yes	38 (19)
No	162 (81)
Duration of disease, years mean (SD)	6.09 + 3.13
Previous inhaler education	
Yes	160 (80)
No	40 (20)

Smoking history	
Yes	14 (7)
No	186 (93)
Poly pharmacy	
Present	60 (30)
Absent	140 (70)
Co-morbidity	
Yes	80 (40)
No	120 (60)
Adherence level	
Adherent (TAI score ≥ 50), n (%)	100 (50)
Intermediate adherent (TAI score 46–49), n (%)	64 (32)
Non-adherent (TAI score ≤ 45), n (%)	36 (18)

A total of 200 asthmatic patients who meets the inclusion criteria were included in the study. Among the total of study participants, higher proportions of patients were female (58%). Most of the participants (45%) were in between 61 and 65 age group. Large number of the respondents, 120 (60%) were unable to read and write. A total of 19% patients had previous history of adverse drug reaction (ADR) to inhalational anti asthmatic

medications. The mean (\pm standard deviation) duration of years living with the disease was 6.09 ± 3.13 ranging from 2 to 19 years. Respondents who were not taking inhaler education were found to be 20%, whereas 7% were smokers. Among the total participants, poly pharmacy was present in 30% of them. Regarding to co-morbidity, 40% of the participants has had at least one more disease in addition to asthma.

Table 2: Factors for non-adherence

Factors for Medication non-adherence	Male N	Female N	P value
High-Cost Medication/Monitory Reason	45	56	0.669
Treatment considers after initial recovery of acute attack/lack of counselling about medication	15	20	0.590
Lack of family support	7	10	0.055
Lack of immediate effect after taking inhaled steroid	5	7	0.900
Forget to take/occupation related problem	6	6	0.533
Poor inhale technique/Trouble in operating dispenser	2	6	0.789
Difficulty to get medication in nearby pharmacy	2	6	0.946
Fear about side effect of the drugs	3	5	0.775

High cost of medicine was the primary reason for drug non-adherence in both male and female group. Treatment considered unnecessary after the initial recovery of acute attack i.e. lack of proper counseling about medication was the second most common cause of non-adherence among both age groups. Other factor of for non-adherence were lack family support, lack of immediate effect after taking inhaled steroid, forget to take

medication, unavailability of medication, fear about the side effects etc.

Discussion

Bronchial asthma, a chronic lung disease that affects people of all ages, races and ethnic groups, is a growing concern throughout the world. Previously done research shows that, adherence to inhaled therapies is worse than that seen with oral or injected therapies in patients with asthma in different age groups. [20-23]

According to study conducted in turkey to assess the effects of training on the correct use of inhalation devices, only 55.3% of patients were able to correctly use the devices before training but after the training, the rate of correct use increased to 83.7%.²⁴ Valid educational programs for asthmatics can improve the knowledge about the disease and to understand how they take their inhalational medications to improve adherence. Patients attending two lessons with helpful training tools significantly increase their knowledge about asthma treatment compliance and patient self-management. [25]

Identifying the reasons for non-adherence to inhalational medications is essential in order to determine the best way to intervene and to increase the control of asthma. The result of previously published study shows that age of the patients, knowledge about the disease, lack of skills about delivery devices, regimen complexity of the medication regimen, adverse effects And lack of health education are some of the factors that affects adherence to inhalational medications. [26-31] Higher rates of non-adherence been associated with Inhaler use potentially because of the increased complexity introduced by the inhalers and lack of skills for appropriate use. [32,33]

Result of previous study shows that the major nondrug factors associated with non-adherence is fear about side effects to the medications. [28] The finding of this study reveals that patients with experience of previous ADR were more likely to be non-adherent to their medications. This is due to the fact that patients may not take their medications, if they fear side effects. Efforts to minimize the level of non-adherence to inhalational medications should be made by letting patients know at the start of the treatment which side effects are possible with a given regimen, monitoring for such effects and provide treatment for adverse effects. [34] This can be achieved through pharmacists even

from beginning with the first dispensing of inhalational anti asthmatics. Another important issue regarding the factors that affect non-adherence to inhalational medications is that poly pharmacy. In the present study Patients who have taken an average of more than 4 drugs are more likely to become non-adherent. Co-morbidity is also one factor that have negative impact on the outcomes of asthma treatment. In our study patients with co-morbidity is 4.6 is more likely to be non-adherent.

Conclusion

The rate of non-adherence to inhalational anti-asthmatics is high. High cost of medicine, lack of financial and family support, lack of education of proper use of inhalational antiasthmatic medications, poly pharmacy and co-morbidities have been identified to have affected non-adherence rate. Therefore, promoting optimal medication adherences through education, proper consultation is essential to optimize the benefits of treatment.

References

1. World Health Organization. Adherence to long-term therapies: evidence for action. World Health Organization; 2003.
2. Ait-Khaled N, Enarson DA, Chiang CY, Marks G, Bissell K. What is asthma? In: Ait-Khaled N, Enarson DA, Chiang CY, Marks G, Bissell K, Management of asthma: A guide to the essentials of good clinical practice. (3rd edn), International Union against Tuberculosis and Lung Disease (The Union), Paris, France. 2008.
3. GINA. Global Strategy for Asthma Management and Prevention. Global Initiative for Asthma. 2003.
4. Van Schayck CP, Van der Heijden FM, van Den Boom G, Tirimanna PR, Van Herwaarden CL. Underdiagnosis of asthma: is the doctor or the patient to blame? The DIMCA project. Thorax. 2000 Jul 1;55(7):562-5.

5. Boulet LP. Perception of the role and potential side effects of inhaled corticosteroids among asthmatic patients. *Chest*. 1998 Mar 1; 113(3): 587-92.
6. Parsons JP, Hallstrand TS, Mastrorarde JG, Kaminsky DA, Rundell KW, Hull JH, Storms WW, Weiler JM, Cheek FM, Wilson KC, Anderson SD. An official American Thoracic Society clinical practice guideline: exercise-induced bronchoconstriction. *Am J Respir Crit Care Med*. 2013;187(9):1016–27.
7. E B, Hurd SS, Barnes PJ, Bousquet J, Drazen JM, FitzGerald M, Gibson P, Ohta K, O'byrne P, Pedersen SE, Pizzichini E. Global strategy for asthma management and prevention: GINA executive summary. *Eur Respir J*. 2008;31(1):143–78.
8. Melani AS, BonaviaM, Cilenti V, Cinti C, LodiM, Martucci P, SerraM, Scichilone N, Sestini P, Aliani M, Neri M. Gruppo Educazionale Associazione Italiana Pneumologi Ospedalieri: inhaler mishandling remains common in real life and is associated with reduced disease control. *Respir Med*. 2011; 105:930–8.
9. Rau JL. Determinants of patient adherence to aerosol regimen. *Respir Care*. 2005; 50:1346–56.
10. Cohen JL, Mann DM, Wisnivesky JP, Home R, Leventhal H, Musumeci-szabo' TJ, Halm EA. Assessing the validity of self-reported medication adherence among inner-city asthmatic adults: the medication adherence report scale for asthma. *Ann Allergy Asthma Immunol*. 2009; 103:325–31.
11. Barnestein-Fonseca P, Leiva-Fernández J, Vidal-España F, García-Ruiz A, Prados-Torres D, Leiva-Fernández F. Efficacy and safety of a multifactor intervention to improve therapeutic adherence in patients with chronic obstructive pulmonary disease (COPD): protocol for the ICEPOC study. *Trials*. 2011;12(1):40.
12. Gamble J, Stevenson M, McClean E, Heaney LG. The prevalence of nonadherence in difficult asthma. *Am J Respir Crit Care Med*. 2009;180(9): 817–22.
13. Broder MS, Chang EY, Kamath T, Sapra S. Poor disease control among insured users of high-dose combination therapy for asthma. In: *Allergy and asthma proceedings*; 2010;31(1):60–67.
14. Cegala DJ, Marinelli T, Post D. The effects of patient communication skills training on compliance. *Arch Fam Med*. 2000;9(1):57.
15. Cerveri I, Locatelli F, Zoia MC, Corsico A, Accordini S, De Marco R. International variations in asthma treatment compliance the results of the European Community respiratory health survey (ECRHS). *Eur Respir J*. 1999; 14(2):288–94.
16. Coutts JA, Gibson NA, Paton JY. Measuring compliance with inhaled medication in asthma. *Arch Dis Child* 1992;67(3):332-3.
17. Bender BG, Pedan A, Varasteh LT. Adherence and persistence with fluticasone propionate/salmeterol combination therapy. *J Allergy Clin Immunol*. 2006;118(4):899–904.
18. Kringsman K, Nilsson JL, Ring L. Refill adherence for patients with asthma and COPD: comparison of a pharmacy record database with manually collected repeat prescriptions. *Pharmacoepidemiol Drug Saf*. 2007;16(4):441–8.
19. Plaza V, López-Viña A, Cosío BG. Test of adherence to inhalers. In: *Archivos de Bronconeumología (English edition)*; 2017.
20. Jones C, Santanello NC, Boccuzzi SJ, Wogen J, Strub P, Nelsen LM. Adherence to prescribed treatment for asthma: evidence from pharmacy benefits data. *J Asthma*. 2003; 40:93e101.
21. McNally KA, Rohan J, Schluchter M, Riekert KA, Vavrek P, Schmidt A, et

- al. Adherence to combined montelukast and fluticasone treatment in economically disadvantaged African american youth with asthma. *J Asthma*. 2009; 46:921e7.
22. Fitzpatrick AM, Kir T, Naeher LP, Fuhrman SC, Hahn K, Teague WG. Tablet and inhaled controller medication refill frequencies in children with asthma. *J Pediatr Nurs*. 2009; 24:81e9.
23. Rand C, Bilderback A, Schiller K, Edelman JM, Hustad CM, Zeiger RS, et al. Adherence with montelukast or fluticasone in a long-term clinical trial: results from the mild asthma montelukast versus inhaled corticosteroid trial. *J Allergy Clin Immunol*. 2007; 119:916e23.
24. Aydemir Y. Assessment of the factors affecting the failure to use inhaler devices before and after training. *Respir Med*. 2015;109(4):451–8.
25. Gaude GS, Hattiholi J, Chaudhury A. Role of health education and self-action plan in improving the drug compliance in bronchial asthma. *Journal of family medicine and primary care*. 2014;3 (1):3.
26. Juniper EF. The impact of patient compliance on effective asthma management. *Curr Opin Pulm Med*. 2003;9(Suppl1): S8–S10.
27. Sprossmann A, Kutschka F, Enk M, Bergmann KC. Factors affecting correct use of metered dose aerosols. *Z Erkr Atmungsorgane*. 1991; 177(1e2): 93e5.
28. Lacasse Y, Archibald H, Ernst P, Boulet L-P. Patterns and determinants of compliance with inhaled steroids in adults with asthma. *Can Respir J*. 2005; 12:211e7.
29. Soriano JB, Rabe KF, Vermeire PA. Predictors of poor asthma control in European adults. *J Asthma*. 2003; 40:803e13.
30. Partridge MR, van der Molen T, Myrseth SE, Busse WW. Attitudes and actions of asthma patients on regular maintenance therapy: the INSPIRE study. *BMC Pulm Med*. 2006; 6:13.
31. D'Amato M, Baiardini I, Solidoro P, Braido F. Adherence to treatment and monitoring tools: what's new? *Minerva Med*. 2016; 07:5–8.
32. Cegala DJ, Marinelli T, Post D. The effects of patient communication skills training on compliance. *Arch Fam Med*. 2000;9:57–64.
33. Braido F, Chrystyn H, Baiardini I, Bosnic-Anticevich S, van der Molen T, Dandurand RJ, Chisholm A, Carter V, Price D. Respiratory effectiveness group. "trying, but failing" - the role of inhaler technique and mode of delivery in respiratory medication adherence. *J Allergy Clin Immunol Pract*. 2016;4(5): 823–32.
34. Khan A., & Tidman D. M. M. Causes of Medication Error in Nursing. *Journal of Medical Research and Health Sciences*. 2022; 5(1): 1753–1764.