

Research Article

A Study of Compliance of Bronchial Asthma in Children in a Tertiary Care Hospital in Central India

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ABSTRACT

Background: Asthma is one of the most common chronic illnesses in children. Despite availability of effective treatment, poor compliance to therapy is a major factor leading to poor control, recurrent hospitalizations, and reduced quality of life.

Objectives: To assess the compliance of children with asthma to prescribed treatment and to evaluate factors influencing compliance.

Methods: A cross-sectional observational study was conducted in children aged 5-15 years with physician-diagnosed asthma attending the pediatric outpatient clinic. Compliance was assessed using a structured questionnaire and the 8-item Morisky Medication Adherence Scale (MMAS-8). Clinical profile, socio-demographic characteristics, and type of therapy were recorded. Statistical analysis was performed to determine associations between compliance and discrete parameters.

Results: Out of 120 children studied, 64 (53.3%) had good compliance, 32 (26.6%) had moderate compliance, and 24 (20%) had poor compliance. Compliance was significantly higher in children of parents with higher education level ($p < 0.05$) and in families from middle/high socioeconomic status. Children using metered-dose inhalers with spacers showed better compliance compared to nebulizer therapy ($p < 0.05$). Forgetfulness, fear of side effects, cost of medication, and lack of regular follow-up were common reasons for poor adherence. Asthma Control Test (ACT) scores were significantly higher in compliant children compared to poorly compliant ones (21.6 ± 2.3 vs 15.8 ± 3.1 , $p < 0.001$).

Conclusion: Compliance to asthma therapy in children remains suboptimal. Parental education, socioeconomic status, and type of drug delivery device significantly influence adherence. Regular counseling, demonstration of inhaler technique, and structured asthma education programs can improve compliance and disease control.

Keywords: Asthma, Children, Compliance, Adherence, Inhaler, Asthma Control.

INTRODUCTION

Asthma is a chronic inflammatory airway disease affecting an estimated 6–10% of children worldwide. It is a leading cause of school absenteeism, emergency visits, and hospital admissions in pediatrics. Despite availability of effective treatment, a large proportion of children remain uncontrolled, largely due to poor compliance with therapy. Compliance or adherence refers to the extent to which patients follow the prescribed medical regimen. Studies show that adherence rates in pediatric asthma are typically <60%. Non-compliance may be due to multiple factors including lack of awareness, poor technique, cost, fear of side effects, social stigma, or

forgetfulness. Understanding these factors in a local context is essential to improve outcomes. This study was conducted to assess the compliance of children with asthma and identify factors associated with good or poor adherence.

MATERIALS AND METHODS

Study Design: Cross-sectional observational study.

Setting: Department of Pediatrics, Lata Mangeshkar Hospital, Nagpur.

Duration: 12 months. January 2025 to December 2025

Sample Size: 120 children.

Inclusion Criteria:

- Children aged 5–15 years with physician-diagnosed asthma (as per GINA guidelines).
- On regular asthma medication for at least 3 months.

Exclusion Criteria:

- Children with other chronic illnesses requiring long-term medications.
- Children whose caregivers refused consent.

Data Collection:

- A structured proforma was used to record age, gender, socioeconomic status, parental education, duration of asthma, frequency of

attacks, hospitalizations, and treatment type.

- Compliance was assessed using parental recall, prescription refill records, and MMAS-8.
- Asthma control was measured using the validated Asthma Control Test (ACT) questionnaire.

Statistical Analysis:

- Descriptive statistics expressed as mean $\pm$ SD and percentages.
- Chi-square test used for categorical variables.
- ANOVA used for continuous variables.
- $P < 0.05$ considered statistically significant.

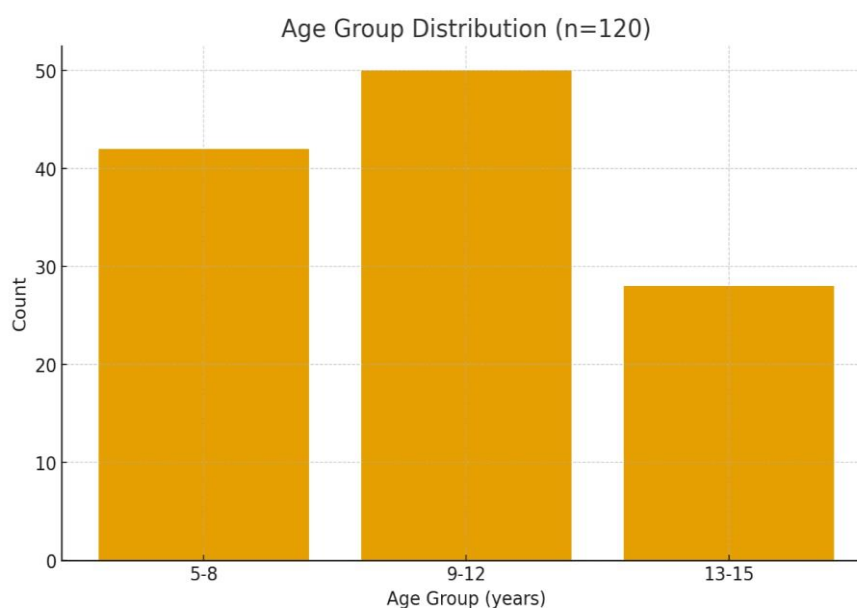
RESULTS

Table 1. Presents the demographic characteristics of the 120 children enrolled in the study. The majority belonged to the 9–12-year age group (42%), followed by 5–8 years (35%) and 13–15 years (23%). Males constituted a slightly higher proportion (56.6%) compared to females (43.3%). Regarding

socioeconomic status, 41.6% of the participants were from lower socioeconomic class, 38.3% from middle class, and 20% from upper class. These variables were summarized using descriptive statistics, and socioeconomic distribution differences were assessed using the Chi-square test.

Table 1: Demographic Profile of Study Participants

Variable	N (%)	Statistical Method
Age Group (Years)	5–8: 42 (35%) 9–12: 50 (42%) 13–15: 28 (23%)	Descriptive Statistics
Gender	Male: 68 (56.6%) Female: 52 (43.3%)	Descriptive Statistics
Socioeconomic Status	Lower: 50 (41.6%) Middle: 46 (38.3%) Upper: 24 (20%)	Socioeconomic Status



Gender Distribution (Pie Chart)

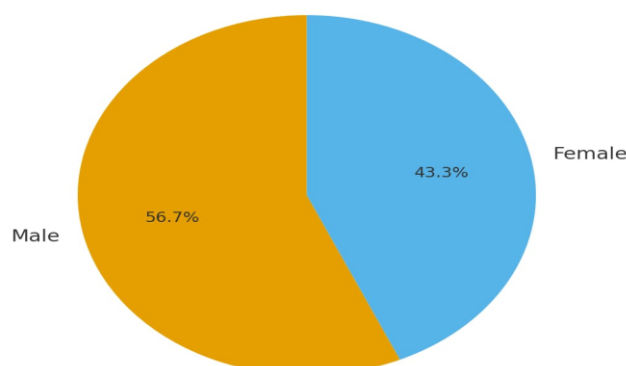


Table 2 shows the clinical characteristics of the study population. The mean duration of asthma was 3.4 ± 1.8 years. In the previous one year, 55% had no hospital admissions, while 31.6% had one to two admissions, and 13.3% had three or more admissions. The mean frequency

of acute attacks was 1.6 ± 0.9 episodes per month. The most commonly used inhalation device was an MDI with spacer (56.6%), followed by nebulizer (26.6%) and DPI (16.6%). Chi-square tests were applied for categorical variables.

Table 2: Clinical Profile of Children with Asthma

Clinical Parameter	Mean $\pm$ Sd / N (%)	Statistical Method
Duration Of Asthma (Years)	3.4 ± 1.8	Mean $\pm$ Sd
Hospital Admissions (Past 1 Year)	0: 66 (55%) 1–2: 38 (31.6%) ≥ 3 : 16 (13.3%)	Chi-Square Test
Frequency Of Acute Attacks (Per Month)	1.6 ± 0.9	Mean $\pm$ Sd
Type Of Device Used	Mdi + Spacer: 68 (56.6%) Nebulizer: 32 (26.6%) Dpi: 20 (16.6%)	Chi-Square Test

Table 3 summarizes compliance levels based on the Modified Morisky Medication Adherence Scale (MMAS-8). Good compliance (score ≥ 6) was observed in 53.3% of children. Moderate

compliance (score 4–5) was seen in 26.6%, while poor compliance (≤ 3) accounted for 20% of the sample. These data were analyzed using descriptive statistics.

Table 3: Compliance Pattern (Mmas-8 Score)

Compliance Level	N (%)	Statistical Method
Good (≥ 6)	64 (53.3%)	Descriptive Statistics
Moderate (4–5)	32 (26.6%)	Descriptive Statistics
Poor (≤ 3)	24 (20%)	Descriptive Statistics

Table 4 demonstrates the relationship between medication compliance and demographic factors. Good compliance was slightly higher among males (57.8%) compared to females, though the association was not statistically significant ($p=0.78$). Parental education showed a strong influence: children whose

parents had higher educational status were significantly more likely to have good compliance (34.3% vs. 14.2%, $p=0.01$). Similarly, children belonging to middle or upper socioeconomic status demonstrated significantly better adherence than those from lower socioeconomic groups (71.8% vs. 42.8%,

p=0.03). Chi-square testing was used to determine these associations.

Table 4: Association between Compliance and Demographic Factors

Variable	Good Compliance (N=64)	Poor/Moderate Compliance (N=56)	P-Value	Statistical Test
Male Gender (%)	37 (57.8%)	31 (55.3%)	0.78	Chi-Square
Higher Parental Education (%)	22 (34.3%)	8 (14.2%)	0.01*	Chi-Square
Middle/Upper SES (%)	46 (71.8%)	24 (42.8%)	0.03*	Chi-Square

Table 5 evaluates clinical outcomes in relation to compliance status. Although the mean duration of asthma did not differ significantly between groups (p=0.20), children with poor compliance exhibited significantly higher frequency of acute attacks per month (2.0 ± 1.0 vs. 1.2 ± 0.7 , p=0.01)

and more hospital admissions in the past year (1.4 ± 0.8 vs. 0.6 ± 0.4 , p=0.02). Regular follow-up visits were markedly more common among good compliers (75%) than poor compliers (32%), showing a highly significant association (p<0.001). t-tests and Chi-square tests were used appropriately.

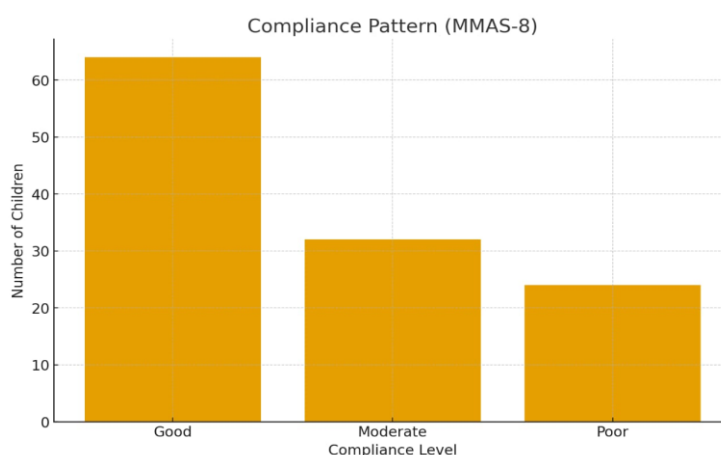


Table 5: Compliance and Clinical Parameter

Clinical Parameter	Good Compliance (Mean $\pm$ Sd)	Poor Compliance (Mean $\pm$ Sd)	P-Value	Statistical Test
Duration Of Asthma (Years)	3.6 ± 1.4	3.1 ± 2.1	0.20	T-Test
No. Of Attacks/Month	1.2 ± 0.7	2.0 ± 1.0	0.01*	T-Test
Hospital Admissions/Year	0.6 ± 0.4	1.4 ± 0.8	0.02*	T-Test
Regular Follow-Up Visits (%)	48 (75%)	18 (32%)	<0.001*	Chi-Square

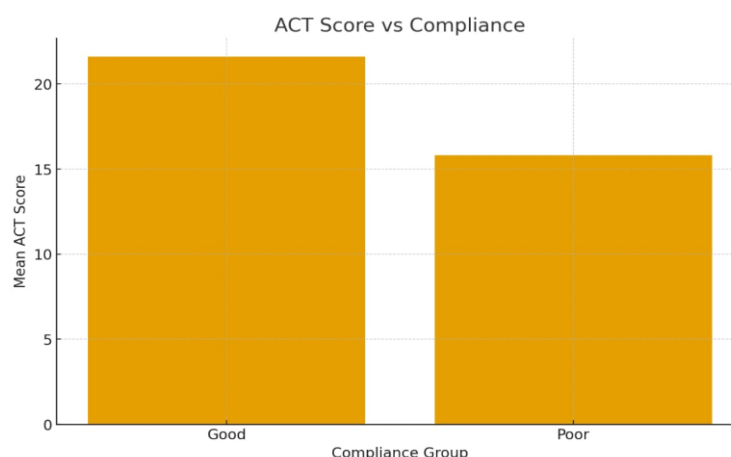


Table 6 depicts the relationship between ACT scores and treatment adherence. Children with good compliance had significantly better asthma control, with a mean ACT score of 21.6 ± 2.3 , compared to 15.8 ± 3.1 in the poor-

compliance group. This difference was statistically significant ($p < 0.001$) using an independent t-test, indicating that better adherence is strongly associated with improved asthma symptom control.

Table 6: Asthma Control Test (ACT) Score vs. Compliance

Compliance Group	Act Score (Mean $\pm$ Sd)	P-Value	Statistical Method
Good Compliance	21.6 $\pm$ 2.3		Independent T-Test
Poor Compliance	15.8 $\pm$ 3.1	<0.001*	Independent T-Test

DISCUSSION

The present study demonstrates that compliance to asthma therapy among children remains far from satisfactory, with only about half of the study participants exhibiting good adherence. This finding mirrors previous Indian and international reports, all of which consistently highlight suboptimal adherence as a major barrier to achieving optimal asthma control in pediatric populations. Studies from eastern and central India have reported adherence rates ranging from 40–55%, while global estimates show that nearly 50–70% of children fail to use their prescribed controller medications regularly. These parallels affirm that poor adherence is not a localized problem but a global public-health concern.

In the current study, parental education and socioeconomic status emerged as significant determinants of adherence. Parents with higher educational attainment displayed better understanding of the chronic and recurrent nature of asthma and the need for sustained controller therapy, even during asymptomatic periods. Conversely, parents from lower socioeconomic backgrounds often faced multiple barriers including medication cost, irregular availability, difficulty accessing healthcare facilities, and competing family

priorities. Several previous studies have similarly emphasized the influence of caregiver literacy, perception of illness, financial constraints, and family structure on long-term asthma management. Misconceptions regarding inhaled corticosteroids—such as fear of addiction, growth retardation, or over-dependence—remain common and further reduce adherence in poorly informed families. An important and clinically relevant observation in this study was the superior adherence among children using metered-dose inhalers (MDIs) with spacers, compared to those relying predominantly on nebulizers. MDIs with spacers are portable, quick to use, less time-consuming, and generally preferred for maintenance therapy. Previous Indian and Western studies have also demonstrated better adherence and improved symptom control with MDI-spacer therapy, particularly when accompanied by correct technique training. Nebulizers, although effective, are often perceived as cumbersome, time-intensive, and dependent on electricity or equipment availability, which may hinder their use in routine maintenance therapy. Moreover, repeated training on inhaler technique is known to significantly improve both technique proficiency and adherence, underscoring the

importance of structured counselling during clinical visits.

The impact of poor adherence was clearly reflected in the significantly lower ACT scores among non-adherent children in this study. This finding reaffirms earlier evidence showing strong correlations between adherence, inhaler technique, symptom control, exacerbation frequency, and overall quality of life. Longitudinal studies have consistently demonstrated that children with good adherence experience fewer night time symptoms, reduced need for rescue medications, and fewer emergency or hospital visits. Poor adherence therefore not only compromises symptom control but also increases healthcare costs and morbidity.

The present study also highlights several psychosocial and behavioral factors influencing adherence. Forgetfulness, irregular routines, poor understanding of asthma chronicity, peer pressure among adolescents, and the assumption that medication is unnecessary during symptom-free periods contribute significantly to missed doses. These behavioral determinants have been widely reported across multiple pediatric adherence studies globally. Therefore, addressing only educational or economic barriers is insufficient; effective adherence interventions must also focus on behavioral modification, empowerment of caregivers, and development of child-friendly self-management strategies.

Given these findings, there is an urgent need for comprehensive, multi-component interventions to improve adherence. Strategies shown to be effective include repeated counselling at every visit, structured demonstration and re-evaluation of inhaler technique, use of reminder systems (phone calls, SMS, mobile apps, inhaler dose counters), school-based asthma education programs, and inclusion of asthma educators or trained nurses in follow-up care. Ensuring availability and affordability of standard asthma medications, particularly in low-resource settings, remains crucial. Tailored interventions addressing parental fears, myths, and socio-cultural beliefs can significantly enhance treatment satisfaction and adherence.

In summary, this study adds to the growing evidence that poor adherence to asthma therapy remains a major obstacle to optimal asthma control in children, particularly in low- and middle-income contexts. Strengthening caregiver education, improving accessibility of inhaler devices, promoting MDI-spacer use, and

implementing regular counselling and follow-up programs are essential steps toward improving long-term outcomes. Future research should focus on community-level interventions, long-term adherence monitoring, and culturally tailored educational models to sustainably improve pediatric asthma management in India.

CONCLUSION

Compliance to asthma treatment in children is suboptimal, influenced by socioeconomic and educational factors, type of inhaler device, and regularity of follow-up. Addressing barriers through structured education, counseling, and affordable treatment strategies is crucial to achieving optimal asthma control.

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