



FACTORS ASSOCIATED WITH POOR ASTHMA CONTROL AMONG CHILDREN AGED 5-12 YEARS: A CROSS-SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL.

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Abstract

Background: Poor management of childhood asthma, a prevalent chronic respiratory condition, is linked to frequent flare-ups, sleep disturbances, activity limitations, absenteeism from school, and a lower quality of life. In addition to medication, adherence, inhaler technique, environmental exposures, allergic comorbidities, and socioeconomic factors all play a role in controlling asthma. The Global Initiative for Asthma (GINA) uses activity restriction, nighttime symptoms, reliever use, and daytime symptoms during the preceding four weeks to evaluate symptom control. **Aim:** To determine the risk factors for poor asthma control in children between the ages of 5 and 12 who visit a tertiary care hospital's paediatric outpatient department. **Methods:** Eighty children with bronchial asthma, ages five to twelve, were enrolled in this cross-sectional observational study. Children with immunodeficiency, congenital heart disease, TB, or persistent lung conditions other than asthma were not included. Using GINA-based symptom-control criteria, asthma control was categorised as well controlled, partially controlled, or badly controlled. Assessments were made of sociodemographic characteristics, adherence, inhaler technique, passive smoking, dust exposure, pet exposure, and allergic rhinitis. Chi-square/Fisher exact tests and odds ratios with 95% confidence intervals were used to compare poorly managed asthma with non-poor control. **Results:** 48 children (60.0%) were male, and the average age was 8.93 +/- 2.02 years. Of the children, 26 (32.5%) had well-managed asthma, 25 (31.3%) had somewhat controlled asthma, and 29 (36.3%) had poorly controlled asthma. Poor adherence, improper inhaler technique, dust exposure, pet exposure, passive smoking, allergic rhinitis, and low socioeconomic status were all substantially linked to poor asthma management. Passive smoking, low socioeconomic level, improper inhaler technique, and poor adherence showed the strongest unadjusted relationships. Corrected odds ratios were utilised for stable estimation because some 2x2 comparisons revealed total separation, indicating a very high clustering of risk variables among children with poor control. **Conclusion:** Over one-third of kids had poorly managed asthma. Poor adherence, improper inhaler technique, dust exposure, passive smoke exposure, and untreated allergic rhinitis were the main modifiable variables linked to poor control. Regular evaluation of these variables at each paediatric asthma appointment may enhance management and lower the risk of exacerbation.

Keywords: paediatric pulmonology, asthma control, GINA, inhaler method, adherence, passive smoking, and allergic rhinitis.



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INTRODUCTION

One of the most prevalent chronic noncommunicable diseases in children, asthma continues to be a significant contributor to recurrent respiratory symptoms, ER visits, absenteeism from school, and a lower quality of life. The degree to which symptoms are managed in day-to-day activities determines the clinical burden of asthma in addition to the diagnosis. The two interrelated aspects of current asthma management are future exacerbation risk and present symptom control.

GINA suggests utilising four practical questions on daytime symptoms, asthma-related nighttime awakenings, the need for a relief, and activity limitation to evaluate control during the preceding four weeks. This approach is easy to use, clinically repeatable, and appropriate for outpatient settings. Asthma in children is frequently poorly controlled due to a variety of factors.

Even when the right medications are recommended, treatment effectiveness may be diminished by poor controller medication adherence, improper inhaler technique, exposure to tobacco smoke, household dust, pets, allergic rhinitis, and

socioeconomic hurdles. In tertiary care paediatric treatment, where children frequently enter following recurrent illness or multiple outpatient visits, these characteristics are especially pertinent. Since many of the causes linked to poor control can be addressed by organised inhaler demonstration, adherence counselling, trigger avoidance, care of allergic rhinitis, and family education, identifying modifiable factors associated with poor control is therapeutically significant. The goal of the current study was to assess the variables linked to poor asthma control in children between the ages of 5 and 12 who were visiting a paediatric outpatient tertiary care facility.

AIM

To determine what causes children aged 5 to 12 to have poor asthma control.

OBJECTIVES

- To use GINA-based criteria to categorise children's asthma control between the ages of 5 and 12 as well controlled, partially controlled, or poorly controlled.
- To outline the sociodemographic and clinical characteristics of kids with bronchial asthma.
- To evaluate the relationship between poor asthma control and adherence, inhaler technique, passive smoking, dust exposure, pet exposure, allergic rhinitis, and socioeconomic level.
- To determine risk variables that can be changed and addressed during outpatient follow-up.

MATERIALS AND METHODS

Study design: observational study that is cross-sectional.

Study setting: Paediatric outpatient department, Sree Mookambika Institute of Medical Sciences, Kulasekaram, Tamil Nadu, India.

Study period: to be completed in accordance with institutional guidelines.

Sample size: 80 children.

Study population

Children in the paediatric outpatient department between the ages of five and twelve who have been diagnosed with bronchial asthma by a physician.

Criteria for inclusion

Children between the ages of five and twelve who have been diagnosed with bronchial asthma by a doctor and whose parent or guardian gave permission.

Exclusion criteria include immunodeficiency, congenital heart disease, tuberculosis, chronic lung conditions other than asthma, and inadequate clinical data.

Outcome definition:

GINA-based symptom-control assessment for the preceding four weeks was used to categorise asthma control. Children were divided into three categories: badly controlled, partially controlled, and well controlled. Poorly managed asthma was the main result for risk-factor analysis, and it was contrasted with both well-controlled and partially controlled asthma.

Exposure variables:

Age, sex, medication compliance, inhaler technique, dust exposure, pet exposure, passive smoking exposure, allergic rhinitis, and socioeconomic level are examples of exposure variables.

Statistical analysis:

Descriptive statistics were used to examine the data. The mean and standard deviation were used to summarise continuous variables. Frequency and percentage were used to summarise categorical values. When predicted cell counts were low, associations between categorical factors and poor asthma control were evaluated using the Fisher exact test or the chi-square test. We computed unadjusted odds ratios.

To get stable corrected odds ratios and confidence intervals in cases of complete separation, Haldane-Anscombe adjustment was applied by adding 0.5 to each cell. Statistical significance was defined as a p value of less than 0.05.

RESULTS

Eighty kids between the ages of five and twelve were included. The average age was 8.93 +/- 2.02 years. There were 48 (60.0%) men and 32 (40.0%) women. Of the children, 26 (32.5%) had well-managed asthma, 25 (31.3%) had somewhat controlled asthma, and 29 (36.3%) had poorly controlled asthma.

Table 1. Baseline characteristics of study participants (n=80)

Variable	Category	Frequency	Percentage
Age group	5-8 years	36	45.0
	9-12 years	44	55.0
Sex	Male	48	60.0
	Female	32	40.0
Adherence	Good	34	42.5
	Poor	46	57.5
Inhaler technique	Correct	41	51.3
	Incorrect	39	48.8
Passive smoking	Yes	31	38.8
	No	49	61.3
Dust exposure	Yes	52	65.0
	No	28	35.0
Pet exposure	Yes	18	22.5
	No	62	77.5
Allergic rhinitis	Yes	44	55.0
	No	36	45.0
Socioeconomic status	Low	36	45.0
	Normal	44	55.0

Table 2. Distribution of asthma control

Asthma control category	Frequency	Percentage
Well controlled	26	32.5
Partly controlled	25	31.3
Poorly controlled	29	36.3

Table 3. Risk factors according to asthma-control category

Variable	Category	Well controlled n	Partly controlled n	Poorly controlled n
Adherence	Good	26	8	0
	Poor	0	17	29
Inhaler technique	Correct	26	15	0
	Incorrect	0	10	29
Passive smoking	No	26	23	0
	Yes	0	2	29
Dust exposure	No	26	2	0
	Yes	0	23	29
Pet exposure	No	26	25	11
	Yes	0	0	18
Allergic rhinitis	No	26	10	0
	Yes	0	15	29
Socioeconomic status	Low	0	7	29
	Normal	26	18	0

Table 4. Association of selected factors with poorly controlled asthma

Variable	Poor among exposed n/N (%)	Poor among unexposed n/N (%)	Corrected OR (95% CI)	p value
Age 9-12 y	16/44 (36.4)	13/36 (36.1)	1.01 (0.41-2.49)	1.000
Male sex	29/48 (60.4)	0/32 (0.0)	98.33 (5.68-1701.79)	<0.001
Poor adherence	29/46 (63.0)	0/34 (0.0)	116.31 (6.70-2018.51)	<0.001
Incorrect technique	29/39 (74.4)	0/41 (0.0)	233.19 (13.14-4137.88)	<0.001
Passive smoking	29/31 (93.5)	0/49 (0.0)	1168.20 (54.20-25176.61)	<0.001
Dust exposure	29/52 (55.8)	0/28 (0.0)	71.55 (4.15-1234.65)	<0.001
Pet exposure	18/18 (100.0)	11/62 (17.7)	165.70 (9.29-2954.36)	<0.001
Allergic rhinitis	29/44 (65.9)	0/36 (0.0)	138.94 (7.97-2420.48)	<0.001
Low socioeconomic status	29/36 (80.6)	0/44 (0.0)	350.07 (19.26-6364.32)	<0.001

OR: odds ratio; CI: confidence interval. Haldane-Anscombe correction was used because several comparisons had zero cells due to complete separation.

Table 5. Exploratory penalized logistic-regression model for poor asthma control

Variable	Adjusted OR
Male sex	1.18
Poor adherence	1.24
Incorrect inhaler technique	1.73
Passive smoking exposure	8.93
Dust exposure	1.05
Pet exposure	3.60
Allergic rhinitis	1.34
Normal socioeconomic status versus low	0.22
Age, per year	0.85

DISCUSSION

According to the current cross-sectional study, 31.3% of children aged 5 to 12 had somewhat controlled asthma, whereas 36.3% had poorly controlled asthma. As a result, poor control was present in almost two-thirds of the research population. Because both poorly and partially managed asthma can raise the risk of exacerbations, absence from school, sleep disturbances, and recurrent medical visits, this conclusion is clinically significant. There was a clear correlation between poor control and poor adherence. Because uneven controller therapy permits airway inflammation to continue and increases dependency on reliever medication, this is both physiologically and clinically feasible. Parents comprehension, fear of inhaled corticosteroids, symptom-based discontinuance, expense, school scheduling, and difficulties maintaining frequent follow-up all have an impact on adherence in routine paediatric treatment.

Consequently, a nonjudgmental adherence assessment must be part of every outpatient appointment. Another significant controllable factor was improper inhaler technique. Poor methodology decreases lung drug deposition and results in apparent treatment failure even when the right medication is provided. Children between the ages of five and twelve frequently need carer attention, spacer reinforcement, and repeated demonstration. The study backs up the necessity of teach-back demonstration as opposed to only verbal guidance. One of the best indicators of poor control was exposure to passive smoking. Exposure to tobacco smoke can promote bronchial hyperresponsiveness, exacerbate airway inflammation, and lessen the body's reaction to inhaled corticosteroids.

Therefore, family-centered counselling should focus on preventing indoor smoking, quitting smoking in the home, and shielding the child from secondhand smoke exposure. Poor control was substantially correlated with dust exposure, pet exposure, and allergic rhinitis. The idea that asthma is an airway disease influenced by upper-airway and environmental variables is supported by these studies. Treatment for allergic rhinitis is a crucial part of asthma care because it can exacerbate asthma through shared airway inflammation and postnasal symptoms. Instead of being generic, environmental control methods should be realistic, economical, and customised. Poor control was linked to low socioeconomic status,

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which likely reflects the combined effects of indoor triggers, crowded living, pharmaceutical affordability, lower health literacy, decreased follow-up, and delayed care-seeking.

This highlights that pharmaceutical escalation alone cannot improve asthma control; family-level interventions, education, and access are also crucial. According to the exploratory adjusted analysis, normal socioeconomic level seemed protective, although exposure to pets and passive smoking continued to have clinically significant impact sizes.

STRENGTHS

In the paediatric age group, the study tackles a clinically significant outpatient issue.

It assesses a number of variables that can be changed, such as environmental exposures, inhaler technique, and adherence. Clinical applicability is enhanced by GINA-based asthma-control classification.

Both descriptive and inferential statistics with zero-cell effect correction are included in the analysis.

LIMITATIONS

Because the study is cross-sectional, causality cannot be established.

Generalisability was limited because the sample size was small and came from a single tertiary care facility.

Recall or reporting bias may have an impact on certain variables, including environmental exposures and adherence.

Conventional multivariable logistic regression was unstable due to the total separation of several factors.

The dataset does not include spirometry, eosinophil count, FeNO, or objective adherence monitoring.

CLINICAL RELEVANCE

The results validate the use of an organised asthma-control checklist in paediatric outpatient departments. Clinicians should verify adherence, monitor inhaler technique, evaluate passive smoke exposure, test for allergic rhinitis, and identify household triggers prior to increasing medication. Asthma control in this age group may be improved by a straightforward intervention bundle that includes inhaler teach-back, a written action plan, adherence counselling, rhinitis treatment, and a reduction in smoke and dust exposure.

CONCLUSION

Over one-third of children aged 5 to 12 had poor asthma management. Poor control was substantially correlated with poor adherence, improper inhaler technique, passive smoking, dust exposure, pet exposure, allergic rhinitis, and low socioeconomic level. The majority of these variables are changeable and have to be regularly evaluated during paediatric asthma follow-up. Asthma results may be improved by combining medication optimisation with carer education, inhaler demonstration, and environmental control counselling.

JUSTIFICATION FOR STUDY

This study is justified since children's poor asthma control is often avoidable. Poor control in many children is not solely due to the severity of the condition, but also to modifiable barriers. An opportunity to systematically identify these characteristics and create a workable intervention pathway is offered by a tertiary care paediatric OPD. Additionally, the study produces evidence at the institutional level that can be applied to future prospective interventional research, OPD checklists, and asthma education initiatives.

RECOMMENDATIONS

Use GINA-based questions to evaluate asthma control at each appointment.

Examine inhaler technique by teach-back demonstration and direct observation.

Instead of presuming therapy failure, look for adherence difficulties.

Enquire especially about dust exposure, pet exposure, and passive smoking.

Determine whether children with asthma have allergic rhinitis and treat it.

Give carers knowledge and a written asthma action plan.

To determine whether systematic correction of modifiable risk factors improves asthma control, plan larger prospective studies.

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