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Research Article

Control Classification of Asthma in Children: Ensuring Compliance

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Abstract

Introduction: Asthma is classified primarily based on the level of control rather than the severity of the underlying illness process, as per the new GINA (Global Initiative for Asthma) guideline.

Objective:

a) To study the control classification in children visiting Asthma Clinic
b) To correlate the control classification with disease progression

Material and Methods: A prospective, cross-sectional observational study was conducted at a tertiary care hospital from January 2013 to December 2021. The revised GINA guidelines were used to diagnose 50 patients aged 7 to 15 with bronchial Asthma for this study. Patients' medical histories and PFT (Pulmonary Function Test) outcomes were noted in a pre-designed form. They were enrolled on their first visit and followed up periodically with a three-monthly interval each.

Results: GINA guideline's control classification aided in analysis of the significant differences in the distribution of progression ($\chi 2 = 34.195$, $p = <0.001$). There were 29 (58.0 percentage)

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patients who were well-controlled, 21 (42.0 percentage) not well controlled with no patients in the poorly controlled category.

Conclusion: Optimizing control in asthmatic children would entail diligent counselling, adherence to therapy and strict compliance.

Keywords

Bronchial Asthma; Control Classification; Pulmonary Function Test; Paediatrics

Introduction

Asthma is a common respiratory condition in children characterized by chronic inflammation of the airways. Shortness of breath, wheezing, cough and chest tightness are all symptoms that may be identified with a variable airflow limitation [1]. Over 300 million persons of different ages, geographic origins and ethnic groups have been diagnosed with asthma and another 100 million are expected to be afflicted by 2025 [2]. The high mortality and morbidity associated with this single disease, justify the need for the development of improved management strategies [3].

Historically, asthma was diagnosed and classified based on the presence, severity and relief of symptoms by usage of ICS (Inhaled Corticosteroid) and reliever medicine. They have all been reported to be discordant over time and abetted GINA to propose new asthma management recommendations based on level of symptom control rather than the severity of the underlying disease process [1]. A paradigm shift in asthma management from relieving acute attacks to achieving optimum asthma control had to be established [4]. A total of 2,184 children and adults with asthma were surveyed in 11 Latin American countries. A minor 2.4 percentage were found to be well controlled while only 6 percentage of patients used routine inhaled corticosteroid therapy. The low percentageage of control was attributed to delayed asthma diagnosis, comorbidities, inadequate treatment, compliance and financial constraints [5-8].

Patients were significantly unaware of the meaning of the word "asthma control," according to a research titled "Failure of Asthma Control," indicating that doctors take several crucial parts of patient education in asthma care for granted. The primary role of the healthcare providers is not only to establish each patient's current clinical control (e.g., symptoms, reliever use and lung function) but also to manage and avoid future risks (for example, lung function failure and exacerbations) [9].

Evaluation of the degree of disease control is pivotal when assessing a patient with asthma. Individuals with asthma are often affected by their symptoms and report significant restrictions

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in their physical activity (including shopping, sports and using stairs). They may find it difficult to obtain a comfortable sleep at night and maybe restricted in their social and work lives. The influence of disease on one's behaviour has been linked to elevated levels of anxiety, fear and depression [10,11]. The utilization of healthcare resources, quality of life and the degree of lifestyle impairment have all been shown to be subjective indicators of excellent control in earlier research [12]. Study findings show an increased risk of physical (OR, 2.58) and daily activity limitations for individuals with asthma that is not properly controlled (OR, 2.62) [13].

Aim and Objectives

1. To study the control classification in children visiting Asthma Clinic
2. To correlate the control classification with disease progression

Materials and Methods

A prospective, cross-sectional observational study was conducted at the Paediatrics Department of a tertiary care hospital from January 2013 to December 2021. The institutional ethics authority gave their approval for this study. Parents and children who fulfilled the inclusion criteria gave their informed assent and consent. A semi-structured case record form was utilized to document demographic information, clinical signs and symptoms. FEV1, FVC, FEV1/FVC ratio and PEFR (Peak Expiratory Flow Rate) were among the measures of the PFT (Pulmonary Function Test). There were a total of 50 patients who participated in this study, aged between 7 to 15 years, diagnosed with Bronchial Asthma as per GINA guidelines. They were enrolled on their first visit and followed up periodically with a three-monthly interval each.

Inclusion Criteria

1. Age of 7 to 15 years of both sexes
2. Patients diagnosed as bronchial asthma (GINA guidelines) and were on regular follow-up
3. Children/parents who had given assent/consent

Exclusion Criteria

1. Patients who did not follow up regularly
2. Parents/children who did not give consent/assent

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Pulmonary Function Testing

The American Thoracic Society recommendation of using a computerized spirometer (Medical International Research: MIR Spirobank G Spirometer) to assess pulmonary function were followed. Measuring and recording of FEV1, FVC and FEV1/FVC ratio were done. All parameters were reported as percentageages of predicted for age, height and gender. A portable Peak Flow Monitor (breath-o-meter) was used to assess PEFR. Expiratory manoeuvres were done three times and the highest value was noted. The result was reported as a percentageage of the predicted for age, height and gender.

Predicted PEFR calculated by (Height in cm-100) * 5 + 100

Statistical Analysis

The mean and standard deviation of quantitative variables were used to represent descriptive variables. Frequency and percentageages were used to represent the qualitative variables. Chi-square test was used to compare categorical and continuous variables; p-values below 0.001 was considered significant.

Observations and Results

The mean age was 11.00 ± 1.96 years with 10 (20.0 percentage) being in the 7-9 years of age group with 40 (80.0 percentage) belonging to the 10-15 years (Fig. 1,2 and Table 1). Males comprised 68.0 percentage of the study subjects while 32.0 percentage were females (Table 2).

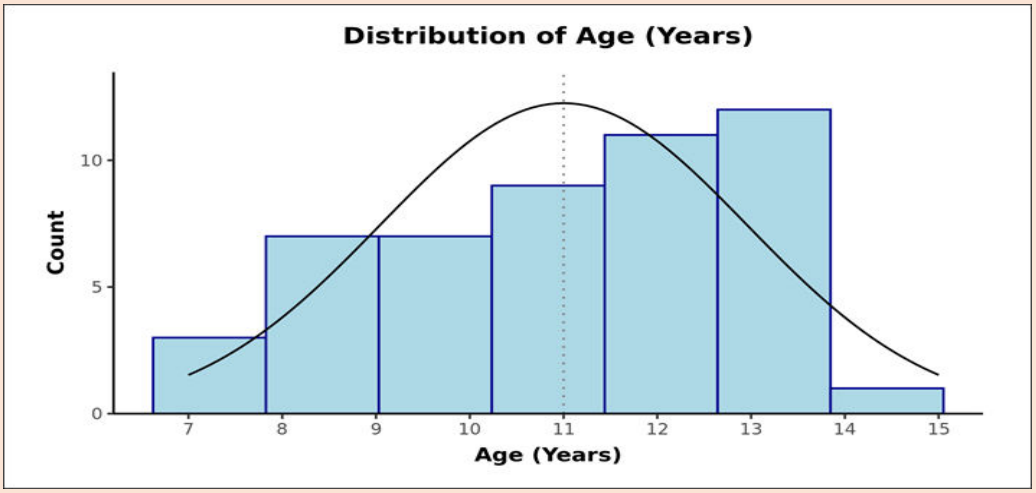

Figure 1: Participant distribution in context of age (n = 50).

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Age	Frequency	Percentage	95 percentage CI
7-9 Years	10	20%	10.5%- 34.1%
10-15 Years	40	80%	65.9% - 89.5%

Table 1: Participant distribution in context of age (n = 50).

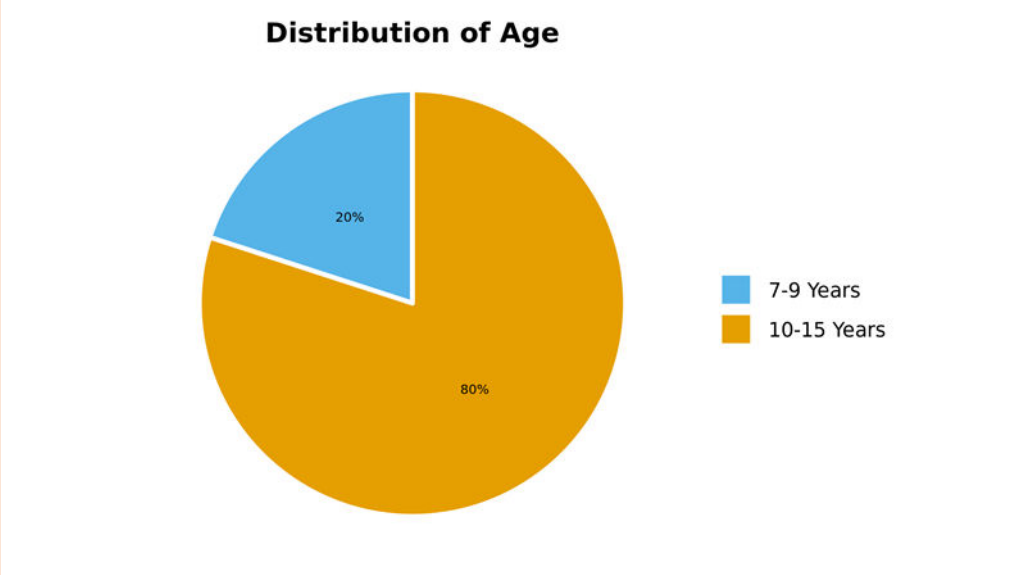

Figure 2: Participant distribution in context of age (n = 50).

Gender	Frequency	Percentage	95 percentage CI
Male	34	68.00%	53.2% - 80.1%
Female	16	32.00%	19.9% - 46.8%

Table 2: Participant distribution in context of gender (n = 50).

The participant distribution in terms of progression revealed 23 (46.0 percentage) showed Improvement, 12 (24.0 percentage) remained Constant and 15 (30.0 percentage) exhibited worsening symptoms (Fig. 3 and Table 3). The asthma control was monitored by performing PFT at enrolment and thereby at three-monthly intervals. On the basis of the GINA guideline's control classification, 29 (58.0 percentage) participants were well-controlled and 21 (42.0 percentage) were not well controlled with no patients in the poorly controlled category (Table 4 and Fig. 4).

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Progression	Frequency	Percentage	95 percentage CI
Improvement	23	46.00%	32.1% - 60.5%
Constant	12	24.00%	13.%- 38.5%
Worsened	15	30.00%	18.3%- 44.8%

Table 3: Participant distribution in context of progression (n = 50).

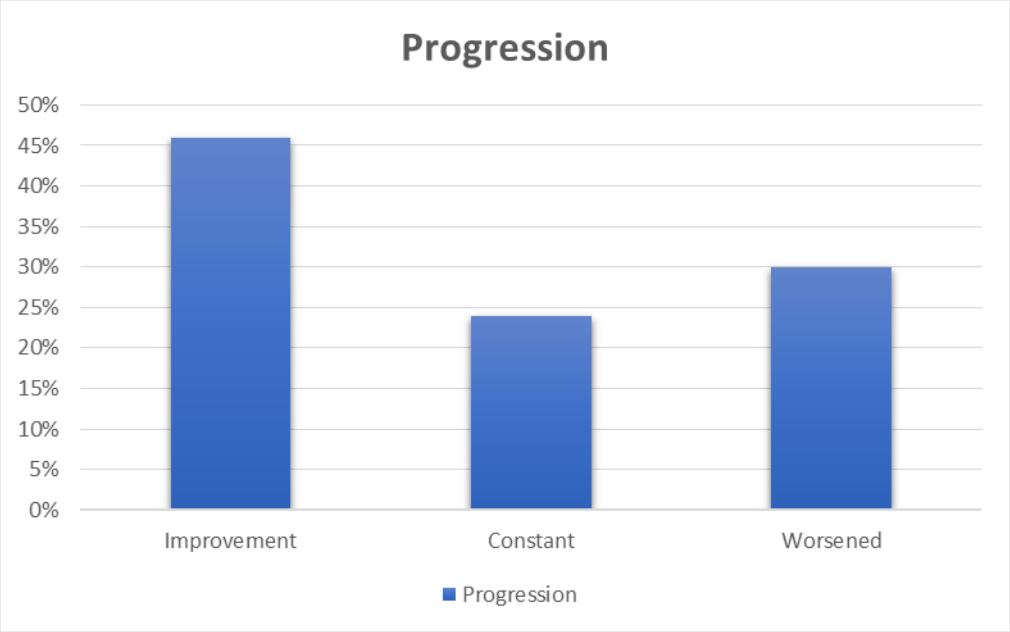

Figure 3: Participant distribution in context of progression (n = 50).

Control Classification	Frequency	Percentage	95 percentage CI
Well-Controlled	29	58.00%	43.3% - 71.5%
Not Well Controlled	21	42.00%	28.5% - 56.7%
Poorly Controlled	0	0	-

Table 4: Participant distribution in context of control classification (n = 50).

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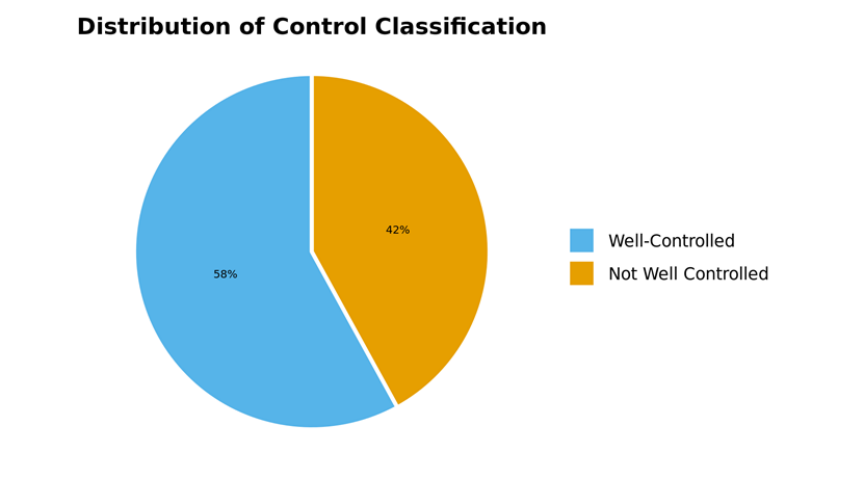

Figure 4: Distribution of the participants in terms of control classification (n = 50).

The relationship between 'Control Classification' and 'Progression' was investigated using the Chi-square test. There was a significant variation in the distribution of progression amongst the different groups in comparison to the control group ($\chi 2$ = 34.195, p = <0.001). A high degree of strength of association was found between the two variables (0.83) (Fig. 5 and Table 5).

Progression	**Control Classification**			**Chi-Square Test**	
	Well-Controlled	Not Well Controlled	Total	χ^2	P-value
Improvement	23 (79.3%)	0 (0.0%)	23 (46.0%)	34.195	<0.001
Constant	5 (17.2%)	7 (33.3%)	12 (24.0%)		
Worsened	1 (3.4%)	14 (66.7%)	15 (30.0%)		
Total	29 (100.0%)	21 (100.0%)	50 (100.0%)		

Progression	**Adjusted P Values**
Improvement vs. Constant	<0.001
Improvement vs. Worsened	<0.001
Constant vs. Worsened	0.06

Table 5: Association between control classification and progression (n = 50).

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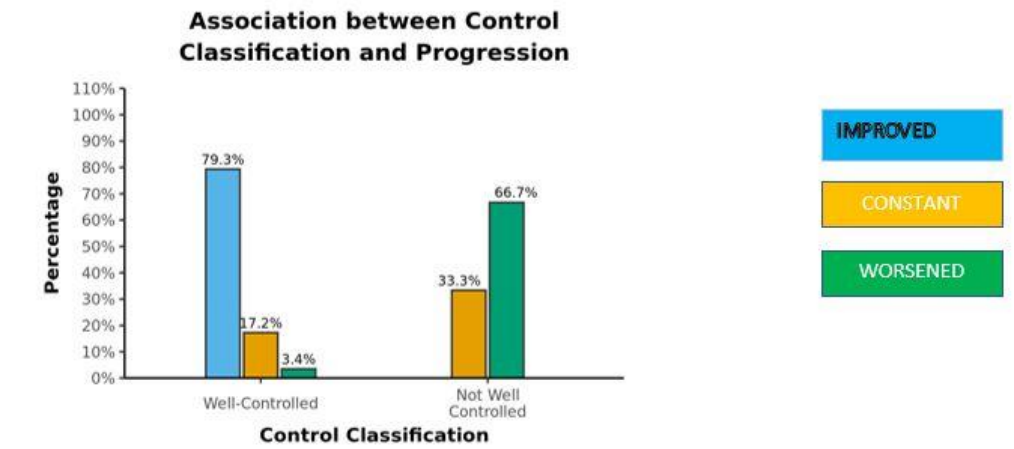

Figure 5: Association between control classification and progression (n = 50).

Discussion

Bronchial Asthma is a major public health issue that has extensive and substantial economic and social consequences. Despite the availability of novel treatment choices and creative combinations of existing pharmacological therapies, asthma management is still a problem [1]. The level of asthma control is measured by persistence, reduction, or absence of asthma manifestations on treatment. GINA guidelines outlined asthma control classification on the basis of daytime symptoms, night awakenings, a need for relievers, activity limitation and lung function tests (Table 6).

We observed a mean age group of 11 years with 20 percentage individuals in the 7 to 9 year of age group and 80 percentage cases in the 10 to 15 years. Higher male preponderance was observed which was similar to an observation made by Postma, et al., [14]. During each visit, the patient was assessed based on control classification. Adherence to treatment with appropriate technique i.e. proper usage and maintenance of inhaler devices was followed. Parental and child concerns with regards to drug side effects, cost, various allergens and steps to limit risk factor exposure were discussed. These measures were in concordance with the multiple previous studies describing poor asthma control [15-19].

Research from various countries around the world has shown asthma control in children in primary care settings to be between 37 percentage-64 percentage, which is similar to our observation of 58 percentage of subjects categorized as well-controlled [17,20-22]. In addition, 46.0 percentage of the individuals in our research reported improved symptoms, fewer exacerbations and fewer hospital stays. In 24.0 percentage of the participants, asthma severity was constant, while 30.0 percentage of the participants showed a worsening severity of symptoms.

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Asthma has been linked to a considerable socioeconomic burden owing to direct expenses (hospitalization, check-ups and medicines) as well as indirect expenses (time missed from work and early death) [7,23]. Lung India conducted cost-of-asthma-therapy research at a private healthcare institution in South India, finding that the yearly expense of asthma therapy is 18,737 INR. Even though the study's sample size was limited to 120 respondents, it was a significant step forward in comprehending the financial burden of asthma therapy. With a conservative prediction of 2 percentage incidence, the annual cost of therapy would amount to 487.2 billion INR [7]. A well-controlled case with fewer exacerbations could establish a significant reduction in the socioeconomic burden. A study by Lahiri, et al., showcased a considerable amount of the annual income of Indian households was being spent on asthma i.e. 28.76 percentage on intermittent, 40.99 percentage on mild persistent and 60.64 percentage on moderate persistent patients [8].

Fear of adverse effects was observed in 13 percentage and 18 percentage of individuals with poorly managed asthma, according to Hinchageri SS, et al. and Gaude GS, et al., respectively. In our study, inspite of a limited sample size there were no subjects in the poorly controlled category. The few factors which determine the better percentage of control in our study were persistent counselling, explaining of the disease process, correct techniques and emphasizing strict follow-up [16,24-27].

According to the GINA guideline objectives, the present level of pediatric asthma management is inadequate, as shown by the AIR (Asthma Insight and Reality) survey. GINA requirements for asthma management were reached by just one in twenty children who are suffering from asthma in Western Europe (5.8 percentage) [28]. There was a significant reduction of exacerbations in our well-controlled subjects on long-term follow-up as compared to their counterparts.

Constantly practicing successful coping techniques may help to minimize psychological morbidity, increase personal control over asthma and improve long-term illness treatment. Avoidance techniques are linked to a lower level of asthma control, which prevents clinical outcomes from deteriorating [29-31]. In our research, we had 58 percentage of well-controlled participants due to the unrelenting encouragement offered to patients and attendants to continue with therapy and supervised instruction on optimal device adherence.

Box 2-2. GINA assessment of asthma control in adults, adolescents and children 6–11 years

A. Asthma symptom control		Level of asthma symptom control		
In the past 4 weeks, has the patient had:		**Well controlled**	**Partly controlled**	**Uncontrolled**
• Daytime asthma symptoms more than twice/week?	Yes☐ No☐	None of these	1–2 of these	3–4 of these
• Any night waking due to asthma?	Yes☐ No☐			
• SABA reliever for symptoms more than twice/week?*	Yes☐ No☐			
• Any activity limitation due to asthma?	Yes☐ No☐			

Table 6: GINA assessment of asthma control.

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Conclusion

Asthma in children is a chronic condition that can't be treated but can be controlled resulting in improved quality of life. Control classification of asthma in children would definitely depend on sound counselling, adherence to therapy and strict compliance.

Competing Interest

Authors declare no conflict of interest.

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