



Asthma control in children and adolescents: a study in clinical practice

Amelia Licari, Gianluigi Marseglia, Maria Angela Tosca & Giorgio Ciprandi

To cite this article: Amelia Licari, Gianluigi Marseglia, Maria Angela Tosca & Giorgio Ciprandi (2019): Asthma control in children and adolescents: a study in clinical practice, Journal of Asthma, DOI: [10.1080/02770903.2019.1594889](https://doi.org/10.1080/02770903.2019.1594889)

To link to this article: <https://doi.org/10.1080/02770903.2019.1594889>



Published online: 24 Apr 2019.



Submit your article to this journal [↗](#)



Article views: 29



View Crossmark data [↗](#)



Asthma control in children and adolescents: a study in clinical practice

Amelia Licari, PhD^a , Gianluigi Marseglia, MD^a , Maria Angela Tosca, PhD^b, and Giorgio Ciprandi, MD^c 

^aDepartment of Pediatrics, Fondazione IRCCS Policlinico San Matteo, University of Pavia, Pavia, Italy; ^bPediatric Allergy Center, Istituto G. Gaslini, Genoa, Italy; ^cAllergy Clinic, Casa di Cura Villa Montallegro, Genoa, Italy

It is well known that uncontrolled asthma should be carefully identified as it represents a risk factor for asthma exacerbation, poor prognosis, and lung function worsening (1). The 2018 Global Initiative for Asthma (GINA) guidelines establish three levels of asthma control: well-controlled, partly controlled, and uncontrolled (2), but in clinical practice, few asthmatics exhibit optimal control of this chronic condition (3). Consequently, investigating the presence of risk factors for poor asthma outcomes is essential, as recently reported (4). Furthermore, the GINA asthma control rating is based on a detailed assessment of symptoms and risk factors for future poor outcomes, such as exacerbations, loss of lung function, or medication side-effects – factors that can be useful in defining the phenotype of the asthmatic patient.

In a recent cross-sectional pediatric study, Rege and colleagues reported on the degree of documentation of asthma control and severity, utilizing data from the 2012 to 2015 National Ambulatory Medical Survey (5). Of 2.47 million average annual visits with asthma as a primary diagnosis, asthma control and severity was documented in only 36.1% and 33.8% of the visits, respectively. These authors concluded that increased documentation of asthma severity and control is critical to improving the quality of asthma care in children.

Adding to these findings, we performed a cross-sectional observation using a series of practical parameters in assessing asthma control in a real-life setting, namely, a tertiary level pediatric asthma clinic. One hundred twenty-one asthmatic children (45 females and 76 males, mean age 11.6 ± 3.2 years) were consecutively enrolled in the study. The visit entailed a careful history, smoke exposure, current use of medications, including inhaled corticosteroids dosage (expressed as beclomethasone equivalence), oral corticosteroids, and long acting β_2 -agonists (LABA), clinical examination, perception of breathing and nasal patency assessed by

the visual analog scale (VAS), nasal total symptom score, peripheral eosinophil count, total IgE, lung function testing, fractional exhaled nitric oxide (FeNO) measurement, body mass index (BMI), hospital anxiety depression scale (HADS) and asthma control test (ACT) questionnaires, GINA asthma control level, and asthma severity grade. The Hospital Review Board approved the study procedure, and written informed consent was obtained from all parents.

Table 1 shows the most relevant findings: 35 patients (29%) had well controlled asthma, 57 (47%) had partly controlled, and 29 (24%) had poorly controlled asthma. The patients were stratified into these three sub-groups according to the level of asthma control defined by the GINA guidelines. One finding worth further research is the relative prevalence of females in the poorly controlled subgroup (55.17%), and their small presence (20%) in the controlled group. Also of interest were findings that the following factors had significant differences among the three sub-groups. Specifically, FEV₁, FEV₁/FVC, FEF_{25–75}, ACT, VAS of breathing perception, HADS–A, HADS–D, the dosage of inhaled and oral corticosteroids, and the asthma severity grade were significantly different among the asthma control groups, and also at the *post hoc* analysis. In contrast, BMI, FVC, FeNO, nasal symptom severity assessed both subjectively and objectively, peripheral eosinophil count, total IgE, LABA use, and passive smoking were not significantly different in the three sub-groups.

Of note, the mean VAS score was <4 in partly and uncontrolled patients, yet, it has been recently reported that a value >6 may be considered a reliable cutoff for normal bronchial airflow, and a value of <6 may predict uncontrolled asthma (6). In addition, VAS assessment was able to predict lung function and bronchodilation results in asthmatic children (6).

These results show that a simple assessment of asthma symptoms and breathing perception by VAS could be useful in obtaining initial information on

Table 1. Comparison of the considered variables in asthmatic children stratified on the basis of the asthma control grade.

Variable	Controlled (N = 35)	Partly controlled (N = 57)	Poorly controlled (N = 29)	p value
Age (years)	11.77 (3.03)	12.16 (3.11)	10.41 (3.32)	.053
Females	7 (20%)	22 (38.6%)	16 (55.17%)*	.014
Males	28 (80%)	35 (61.4%)	13 (44.83%)	
BMI	20.04 (3.61)	19.97 (3.49)	20.44 (4.47)	.861
FVC (% of predicted)	103 (9.323)	105.8 (12.45)	101.3 (16.36)	.278
FEV ₁ (% of predicted)	98.94 (10.35)	97.44 (12.44)	90.41 (16.37)*	.022
FEV ₁ /FVC	94.26 (7.11)	90.72 (8.50)	86.79 (10.36)**	.004
FEF _{25–75} (% of predicted)	90.57 (18.73)	83.58 (21.76)	73.41 (24.11)**	.008
FeNO (ppb)	26 (22–44)	32 (23.5–41)	42 (19.5–59)	.20
ACT	24 (23–25)§§§	20 (18.5–21)***	16 (14–18)***	<.0001
Nasal TSS	4 (0.5–7)	5 (2–7)	6 (3–9.5)	.07
VAS breathing	9 (7–10)	3 (1–4)***	3 (1–4)***	<.0001
VAS nasal patency	7 (5–10)	7 (5–9)	6 (4–8)	.21
Peripheral eosinophils (cells/mm ³)	400 (200–600)	300 (200–500)	300 (200–550)	.92
Total IgE kU/L	415.5 (131–639.5)	349 (127.5–649)	294 (83.7–859)	.93
HADS-A	6 (4–9)	9 (4–12)	10 (5–12)*	.014
HADS-D	4 (2–6)	5 (3–7)	5 (4–9.5)*	.030
ICS dosage (mcg)	500 (500–820)	640 (500–1000)	500 (500–1000)*	.014
Oral Corticosteroids	0 (0%)	2 (3.51%)	4 (13.79%)	.045#
Long-acting B-agonists	26 (74.29%)	49 (85.96%)	26 (89.66%)	.24#
Leukotriene Antagonist	5 (14.29%)	6 (10.53%)	8 (27.59%)	.14#
Passive Smoking	10 (28.57%)	22 (38.6%)	14 (48.28%)	.77#
Asthma Severity				
mild	4 (11.43%)	1 (1.75%)*	0 (0%)**	.0010
moderate	17 (48.57%)	16 (28.07%)	4 (13.79%)	
severe	14 (40%)	40 (70.18%)	25 (86.21%)	

FVC: forced vital capacity; FEV₁: forced expiratory volume in one second; FEF_{25–75}: forced expiratory flow at 25% to 75% of pulmonary volume; FeNO: fractional exhaled nitric oxide; HADS: Hospital anxiety and depression scale; ICS: inhaled corticosteroids; Nasal TSS: total symptom score; VAS: visual analog scale.

* $p < .05$, vs. controlled asthma.

** $p < .01$, vs. controlled asthma.

*** $p < .001$, vs. controlled asthma.

§§§ $p < .001$, vs. partially controlled asthma.

asthma control. This information is clinically relevant, and may be gathered outside the hospital setting, such as the family pediatrician's office or at home.

Outcomes of this cross-sectional study suggest that observing a wider range of parameters allows for better framing of asthmatics, particularly the characterization of their phenotype/endotype. Patients with uncontrolled asthma tended to have more impaired lung function, lower ACT score, anxiety (such as HADS-A score >7), lower symptom VAS score, higher controlled medication use, and obviously, more severe asthma than other asthmatics.

The key limitation of this report is that it lacks follow-up, so a longitudinal study is ongoing to understand why some patients may remain uncontrolled despite optimal care. That study is also identifying the risk factors and/or treatment response to help determine if poor control at one-time point is associated with poor outcomes in the long term.

In conclusion, we suggest that asthma control should be rated on the basis of more information than symptoms assessment alone as this approach may be useful for phenotyping patients and consequently, personalizing therapy. In addition, children's

perception of symptoms measured by VAS and ACT could provide helpful information to clinical practice.

Declaration of interest

The authors declare that they have no conflict of interest.

ORCID

Amelia Licari  <http://orcid.org/0000-0002-1773-6482>

Gianluigi Marseglia  <http://orcid.org/0000-0003-3662-0159>

Giorgio Ciprandi  <http://orcid.org/0000-0001-7016-8421>

References

1. Meltzer EO, Busse WW, Wenzel SE, Belozeroff V, Weng HH, Feng J, Chon Y, et al. Use of the asthma control Questionnaire to predict future risk of asthma exacerbation. *J Allergy Clin Immunol* 2011;127: 167–172. doi:10.1016/j.jaci.2010.08.042.
2. Global Initiative for Asthma. GINA guidelines. Global strategy for asthma management and prevention. 2018. Available at: <http://www.ginasthma.org/> [last accessed January 2019].

3. Guenter K, Boeselt T, Kroenig J, Hildebrandt O, Koehler N, Viniol C, Koehler U, et al. [Asthma Control in Adults and Children Must be Improved!] *Pneumologie* 2018;72:681–686. doi:[10.1055/a-0629-4242](https://doi.org/10.1055/a-0629-4242).
4. Licari A, Brambilla I, Marseglia A, De Filippo M, et al. Difficult vs severe asthma: definition and limits of asthma control in the pediatric population. *Front Pediatr* 2018;6:170.
5. Rege S, Kavati A, Ortiz B, Mosnaim G, Cabana MD, Murphy K, Aparasu RR, et al. Documentation of asthma control and severity in pediatrics: analysis of national office-based visits. *J Asthma* 2019;1. (in press). doi:[10.1080/02770903.2018.1554069](https://doi.org/10.1080/02770903.2018.1554069).
6. Tosca MA, Silvestri M, Olcese R, Pistorio A, Rossi GA, Ciprandi G. Breathlessness perception assessed by visual analogue scale and lung function in children with asthma: a real-life study. *Ped Allergy Immunol* 2012;23:537–542.