

Asthma during adolescence impairs health-related quality of life



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Clinical Implications

- Asthma during adolescence impairs health-related quality of life, especially if the asthma is uncontrolled. To use questions about health-related quality of life (HRQoL) and markers associated with asthma control in the clinic can identify adolescents with an increased risk for impaired HRQoL.

TO THE EDITOR:

Asthma affects approximately 7%-10% of all adolescents¹ and comorbidity is common.² Adolescence is a period of many changes, and it is a time when adolescents gradually develop independence from their parents and their peer group becomes more influential.³ From a clinical perspective, it is known that asthma in adolescence can be particularly difficult to treat.⁴ The aim of the present study was to examine health-related quality of life (HRQoL) among adolescents in relation to asthma using self-assessed data. A secondary aim was to investigate if the level of asthma control affects HRQoL.

The study was conducted within the population-based prospective birth cohort, BAMSE. The study population consisted of 2946 adolescents with data (questionnaire and clinical examination) on symptoms of asthma, other allergy-related diseases, and HRQoL at 16 years of age (mean age 16.5 years, range 15.7-18.9). Self-assessed information about HRQoL was obtained with the generic and validated instrument EQ-5D-3L consisting of a descriptive system and visual analog scale (VAS).⁵ Differences between groups with regard to median EQ VAS scores were tested with a 2-sample Wilcoxon-Mann-Whitney's test, and a *P* value of $\leq .05$ was considered significant.

The distribution of background characteristics such as socioeconomic status and parental allergic disease in the study population was comparable to the original cohort (Table E1, available in this article's Online Repository at www.jaci-inpractice.org). The health outcomes used in the present study are described in Table E2, available in this article's Online Repository at www.jaci-inpractice.org. Asthma was reported by 7.6% of the study population. There was a higher percentage of female, allergic heredity, and having a young mother in those with asthma ($P \leq .05$) (Table E3, available in this article's Online Repository at www.jaci-inpractice.org).

The median EQ VAS in the study population was 90, ranging from 3 to 100. Female sex and being a smoker were associated with lower EQ VAS ($P \leq .001$) (Table E4, available in this article's Online Repository at www.jaci-inpractice.org).

TABLE I. Distribution of EQ-5D among adolescents with (*n* = 223) and without asthma (*n* = 2723)

Dimensions	Yes asthma (<i>n</i> = 223) <i>n</i> (%)	No asthma (<i>n</i> = 2723) <i>n</i> (%)	<i>P</i> value*
Mobility			
No problems	219 (98.2)	2693 (99.0)	
Some problems	4 (1.8)	27 (1.0)	.26
Extreme problems	0 (0)	0 (0)	
Self-care			
No problems	220 (98.6)	2699 (99.2)	
Some problems	0 (0)	13 (0.5)	.36
Extreme problems	3 (1.4)	8 (0.3)	
Usual activities			
No problems	212 (95.0)	2623 (96.5)	
Some problems	9 (4.0)	87 (3.2)	.27
Extreme problems	2 (1.0)	8 (0.3)	
Pain or discomfort			
No problems	150 (67.6)	2229 (82.0)	
Some problems	71 (32.0)	480 (17.7)	<.001
Extreme problems	1 (0.4)	8 (0.3)	
Anxiety or depression			
No problems	160 (72.1)	2111 (77.7)	
Some problems	57 (25.7)	570 (21.0)	.053
Extreme problems	5 (2.2)	35 (1.3)	
EQ VAS mean (SD)	83.02 (14.1)	85.6 (13.3)	
EQ VAS median (IQR)	85 (80-90)	90 (80-95)	.002†

VAS, Visual analog scale.

*Some problems and extreme problems in the EQ-5D dimensions were collapsed before conducting the analysis. Differences between groups with regard to percentage of reported problems in the EQ-5D descriptive system were tested with χ^2 test statistic.

†Differences between groups with regard to median EQ VAS scores were tested with a 2-sample Wilcoxon-Mann-Whitney's test, and a *P* value of $\leq .05$ was considered significant.

Moreover, adolescents with asthma reported lower EQ VAS scores compared with adolescents without asthma (median 85 vs 90, $P = .002$) (Table I). In addition, females with asthma reported lower median EQ VAS scores than males with asthma (85 vs 90). By applying a quantile multiple regression model assessing the association between HRQoL and asthma adjusting for potential confounders (smoking, sex, and current eczema), we found that asthma lowered the EQ VAS score in the 50th percentile ($P = .053$) and in the 75th percentile ($P = .006$). However, no significant association with sex was present.

In the EQ-5D dimension pain or discomfort, adolescents with asthma reported more problems compared with adolescents without asthma ($P < .001$) (Table I). In a separate stratified analysis, we found that females with asthma also reported significantly more problems compared with males with asthma in this dimension (39.4% vs 23.2%, $P = .01$).

Adolescents with nonallergic asthma (*n* = 50) had a significantly lower median EQ VAS score than adolescents with allergic asthma (*n* = 145) (82.5 vs 85, respectively) ($P = .03$). In contrast, there was no difference in median EQ VAS among adolescents with asthma who also had eczema and/or rhinitis (*n* = 159) compared with adolescents who had only asthma (*n* = 58) (85 vs 85, respectively, $P = .69$).

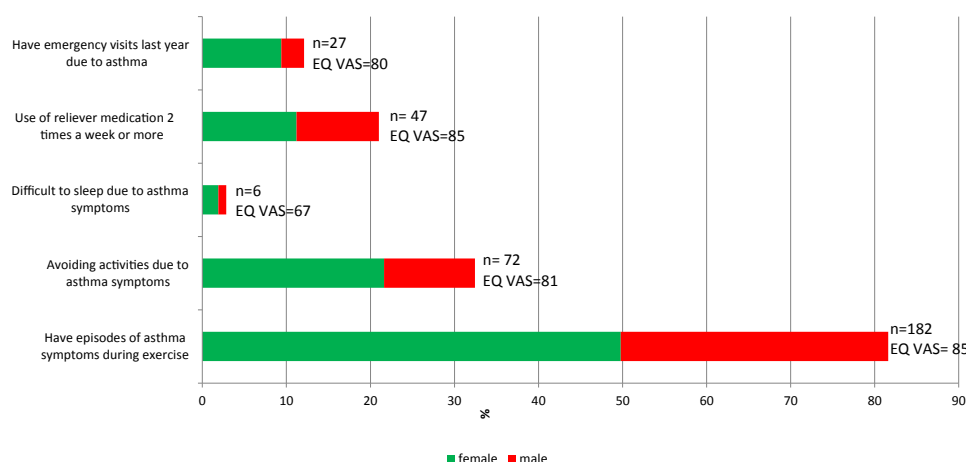


FIGURE 1. Markers associated with impaired asthma control and median EQ visual analog scale (VAS) among adolescents with asthma (n = 223). The figure reported percentage of markers associated with impaired asthma control and median EQ VAS for each marker.

Among the adolescents with asthma, markers associated with impaired asthma control were common (Figure 1). Episodes of wheezing during exercise (82%) were most frequently reported, followed by avoidance of activities due to asthma symptoms (33%). To investigate if the level of asthma control affects HRQoL, we constructed an asthma control variable modified from the GINA guidelines.¹ This variable was defined as controlled, partly controlled, and uncontrolled asthma (Table E2, available in this article's Online Repository at www.jaci-inpractice.org). In total, 11% of the adolescents with asthma had controlled asthma, 83% partly controlled asthma, and 6% uncontrolled asthma. Both adolescents with partly controlled and uncontrolled asthma reported significantly lower median EQ VAS scores compared with those with controlled asthma (85 vs 90, $P = .04$ and 70 vs 90, $P = .003$). Of further interest was the observation that adolescents with controlled asthma had the same median EQ VAS (90) as adolescents without asthma.

The strengths of the present study include the population-based design with the use of self-assessed information on HRQoL, the large study sample, and high response rate (78%) that brings generalizability to the results. The use of a generic instrument has given us the possibility of measuring HRQoL in a general population, as well as the possibility of finding non-organ-specific effects of asthma. This is important especially because asthma is a systemic disease. One weakness is that our definition of asthma control reflected a period of 12 months in contrast to GINA's recommended 4 weeks that may result in recall bias both over- and underestimating frequency of self-reported symptoms.

Our finding that adolescents with nonallergic asthma had lower median EQ VAS than adolescents with allergic asthma may be explained by the fact that nonallergic asthma is often more severe, more difficult to control, and is characterized by more exacerbations, and impaired lung function as compared with allergic asthma.⁶ This indicates that this group should be observed more closely, especially if they have a partly or uncontrolled asthma.

Many of the adolescents with asthma reported symptoms during exercise and a third avoided activities because of asthma symptoms (Figure 1). Other studies have also shown that

children and adolescents feel that their asthma affects their ability to participate in sports, and this has a substantial impact on their daily lives.⁷ Furthermore, utilization of the EQ-5D instrument in other studies has shown that younger children with asthma report a higher EQ VAS score than adolescents with asthma.^{8,9} This adds support to the fact that adolescence is a sensitive period in life and therefore it is important that clinicians pay attention to adolescents' specific needs focusing on both physical and psychological limitations to provide optimal asthma care and well-being for adolescents with asthma. Our results show that improved well-being may be achieved with better asthma control. By using questions about HRQoL as well as questions about markers associated with asthma control in the clinic, adolescents with an increased risk for impaired HRQoL can be identified.

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Conflicts of interest: The authors declare that they have no relevant conflicts.

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TABLE E1. Background characteristics for adolescents in the total cohort (N = 4089) and study population (n = 2946)

Background factors	Cohort (N = 4089) n (%)	Study population (N = 2946)	
		n (%)	95% CI
Male	2065 (50.5)	1447 (49.1)	48.2-50.0
Heredity*	1200 (29.7)	900 (30.5)	29.7-31.3
Young mother (<25 y)†	319 (7.8)	210 (7.1)	6.7-7.6
Any parents smoked at baseline	855 (21.0)	592 (20.1)	19.4-20.8
Low socioeconomic‡	695 (17.3)	465 (16.0)	15.3-16.6

*Heredity: mother and/or father with doctor' diagnosis of asthma and asthma medication and/or doctor's diagnosis of having hay fever in combination with furred pets and/or pollen allergy.

†Young mother < 25 y old.

‡Both parents have low socioeconomic status; defined as blue-collar workers according to the Nordic standard occupational classification and Swedish socioeconomic classification.

TABLE E2. Definition of health outcomes and asthma control at 16 y

Variables	Definition
Self-reported asthma	Asthma was defined as having at least 4 episodes of wheezing in the last 12 mo or at least 1 episode of wheezing in combination with occasional or regular use of prescribed inhaled steroids
Self-reported allergy-related outcomes	Eczema was defined as dry skin in combination with itchy rash and typical localization on the arms, leg flexures, wrists/ankles, or neck Rhinitis was defined as symptoms of sneezing, a runny blocked nose, or itchy, red watery eyes after exposure to furred pets or pollen in the last 12 mo
Allergic asthma	Asthma with positive for inhalant allergens (Phadiatop) and/or food allergens (fx5) (Thermo Fisher Scientific, Uppsala, Sweden). Subjects were considered allergen sensitized if IgE > 0.35 kU/L for Phadiatop (birch and grass pollen; house dust mite; mold; and cat, dog, and horse dander) and/or fx5 (egg, milk, fish, soy, wheat, peanut)
Markers of asthma control	Self-reported markers associated with impaired asthma control in the last 12 mo included limitations during exercise and/or avoiding activities due to asthma symptoms, night awakening due to asthma symptoms once a week or more, use of reliever more than twice a week (self-reported), and emergency room visits due to asthma (parental reported). All markers were responded to with "yes or no" and asthma control was classified according to the number of markers answered with yes as controlled (0 markers), partly controlled (1-2 markers), or uncontrolled (3-4 markers)

TABLE E3. Distribution of selected background factors and self-reported smoker at 16 y among adolescents with and without asthma

Background factors	Yes asthma (n = 223) N (%)	No asthma (n = 2723) N (%)	P value [†]
Female (n = 1499)	128 (57)	1371 (50)	.04
Male (n = 1447)	95 (43)	1352 (50)	
Allergic heredity			
Yes (n = 900)	104 (47)	796 (29)	<.001
No (n = 2046)	119 (53)	1927 (71)	
Exposed to ETS			
Yes (n = 592)	50 (22)	542 (20)	.37
No (n = 2354)	173 (78)	2181 (80)	
Young mother < 25 y old			
Yes (n = 210)	24 (11)	186 (7)	.03
No (n = 2736)	199 (89)	2537 (93)	
Low socioeconomic status*			
Yes (n = 465)	45 (20)	420 (16)	.06
No (n = 2450)	175 (80)	2275 (84)	
Self-reported smoker at 16 y (sometimes or daily)			
Yes (n = 332)	25 (11)	307 (11)	.99
No (n = 2607)	197 (89)	2410 (89)	

ETS, Environmental tobacco smoke.

*Both parents are defined as blue-collar workers according to the Nordic standard occupational classification and the Swedish socioeconomic classification.

†Differences between groups with or without asthma were tested with χ^2 test statistic, and a P value of $\leq .05$ was considered significant.**TABLE E4.** Distribution of selected background factors and self-reported smoker at 16 y in relation to EQ visual analog scale (VAS) (n = 2946)

Background factors	Data from enrolment at 2 mo of age			P value [†]
	n (%)	Mean EQ VAS (SD)	Median EQ VAS (IQR 25%-75%)	
All adolescents	2946 (100)	85.5 (13.4)	90 (80-95)	
Sex				
Female	1499 (51)	83.8 (14.1)	87 (80-95)	<.001
Male	1447 (49)	87.0 (12.3)	90 (80-95)	
Allergic heredity				
Yes	900 (31)	85.5 (13.5)	90 (80-95)	.67
No	2046 (69)	85.4 (13.3)	90 (80-95)	
Exposed to ETS				
Yes	592 (20)	84.5 (14.4)	89.5 (80-95)	.11
No	2354 (80)	85.6 (13.1)	90 (80-95)	
Young mother < 25 y old				
Yes	210 (7)	84.8 (14.8)	90 (80-95)	.10
No	2736 (93)	85.5 (13.2)	90 (80-95)	
Low socioeconomic status*				
Yes	465 (16)	84.9 (13.8)	90 (80-95)	.56
No	2450 (84)	85.5 (13.3)	90 (80-95)	
Self-reported smoker at 16 y (sometimes or daily)				
Yes	332 (11)	81.0 (13.8)	83.5 (75-90)	<.001
No	2607 (89)	86.0 (13.2)	90.0 (80-95)	

ETS, Environmental tobacco smoke.

*Both parents are defined as blue-collar workers according to the Nordic standard occupational classification and the Swedish socioeconomic classification.

†Differences between groups with regard to median EQ VAS scores were tested with a 2-sample Wilcoxon-Mann-Whitney's test, and a P value of $\leq .05$ was considered significant.

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