

Adolescent Versus Parent Reports on Asthma and Asthma Symptoms

Orly Romano-Zelekha, PhD,^{1*} Yael Graif, MD,² Serine Sultan, BA,³ Irit Livne, MPH,⁴ and Tamy Shohat, MD^{1,3}

Summary. Purpose: Epidemiological studies of asthma in adolescence commonly rely on self-reports. This study aimed to compare adolescent and parent reports regarding the presence of asthma and asthma symptoms in two ethnic groups, Jews and Arabs, living in the same country. Methods: Eighth-grade pupils attending five schools in Tel Aviv and four schools in two Arab cities in Israel were asked to complete the self-report International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire in the classroom. Their parents were interviewed by telephone using the parental ISAAC questionnaire. We assessed prevalence rates of asthma and asthma symptoms according to adolescent and parent responses. Agreement between adolescents and parents was assessed by Cohen's kappa coefficient. Results: Adolescents reported more asthma and asthma symptoms than their parents in both the Jewish (327 adolescent-parent pairs) and the Arab (335 adolescent-parent pairs) groups. Both groups showed moderate adolescent-parent chance-corrected agreement for current asthma (kappa 0.59 in Jews, 0.52 in Arabs, $P = 0.60$) and lifetime asthma (kappa 0.53 Jews, 0.44 in Arabs, $P = 0.33$); and slight to fair chance-corrected agreement for asthma symptoms. There were no statistically significant differences between the Jewish and Arab populations in chance-corrected agreement for any of the parameters assessed. Conclusions: Jewish and Arab adolescents more often report asthma and asthma symptoms than do their parents. This seems to be a cross-cultural phenomenon. Therefore, particular attention should be paid to the source of information when comparing prevalence of asthma and asthma symptoms across studies. **Pediatr Pulmonol.** © 2016 Wiley Periodicals, Inc.

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INTRODUCTION

Prevalence rates of asthma and asthma symptoms among adolescents are usually estimated on the basis of questionnaires such as the International Study of Asthma and Allergies in Childhood (ISAAC).¹ The ISAAC questionnaire was developed to promote a standardized methodology for estimating asthma prevalence within and between countries. Versions of the questionnaire were designed for self-completion by older children (13–14 years old), and for completion by parents for younger children (6–7 years old).

A number of studies have examined the prevalence of asthma and asthma symptoms, while comparing parental and self-reports. Two studies from Sweden,^{2,3} compared reports of children and their parents; the first³ was a longitudinal birth cohort of 2,744 children and their parents, and the second was a sample of 294 13–14-year-old children and their parents. Both studies found good agreement for asthma medication (kappa = 0.78² and 0.87,³ respectively) and for lifetime asthma (kappa = 0.86²). Similar results were obtained from studies conducted in the USA,^{4,5} Chile,⁶ Switzerland,⁷ and Italy,⁸ in which teenagers and their

¹Israel Center for Disease Control, Gertner Institute, Sheba Medical Center, Tel Hashomer 52621, Israel.

²Allergy and Immunology Clinic, Pulmonary Institute, Rabin Medical Center, Petach Tikva, and Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.

³Department of Epidemiology and Preventive Medicine, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.

⁴Israel Ministry of Education, Jerusalem, Israel.

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*Correspondence to: Orly Romano-Zelekha, PhD, Israel Center for Disease Control, Gertner Institute, Sheba Medical Center, Tel Hashomer 52621, Israel. E-mail: orly.romano@MOH.health.gov.il

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parents completed the ISSAC questionnaire; kappa values were in the range of 0.68–0.80^{4–7} for lifetime asthma and 0.76⁴ and 0.65⁸ for current asthma. For asthma symptoms, agreement was lower: 0.20–0.61^{2,6–8} for wheezing in the last 12 months, 0.21–0.51^{2–4,6–7} for wheezing during exercise, 0.11⁴ for speech limitation due to wheezing, and 0.24⁹ for nocturnal cough.

The Israeli population comprises two main population groups—Jews (75%) and Arabs (25%).¹⁰ According to a large national study of adolescents conducted in 2003, rates of asthma and asthma symptoms were significantly lower among Arabs than among Jews¹¹: 4.5% and 7.2%, respectively ($P < 0.01$) for current asthma; and 8.2% and 16.2%, respectively ($P < 0.01$)¹¹ for wheezing in the preceding 12 months. Other studies reported lower rates of allergic rhinitis among Arab children,¹² and lower rates of attention deficit disorder among Arab students.¹³ The Jewish and Arab populations differ regarding several demographic characteristics and health behaviors that can affect morbidity rates. Among Arabs, families are significantly larger (more siblings), paternal smoking is high, and maternal smoking is low.¹⁴

Due to the differences in prevalence of asthma and rhinitis, and in demographic and lifestyle factors between Arabs and Jews, we investigated in this study, the agreement between parent and self report between these populations. The results will help in the interpretation of research findings based on adolescent or parent reports in each population, and in comparing findings between the populations. Our findings may also be relevant to studies that compare asthma prevalence between other ethnic groups, and brings attention to the importance of correct interpretation of prevalence studies in this field in general.

MATERIALS AND METHODS

Subjects and Procedure

This is a cross-sectional study conducted in Israel in May 2011 among Jewish and Arab adolescents, using the self-report ISAAC protocol, and among their parents, using the parental ISAAC questionnaire.¹

An explanatory letter was sent to the parents of all eighth-graders attending five schools in the Tel Aviv district and four schools in two large Arab cities, inviting them and their adolescent children to participate in a study on the health status of adolescents. Those who consented signed an informed consent form. The adolescents were asked to complete the ISAAC questionnaire¹⁵ in the classroom; the parents were interviewed by telephone according to the parental ISAAC questionnaire,¹ in their

native language. Adolescents who were absent from school on the day of the study were asked to complete the questionnaire during the following week. We added to the core questionnaire several demographic questions. The study protocol was approved by the Institutional Review Board of Sheba Medical Center.

Definitions

Lifetime asthma was defined as a “yes” response to the question, “Have you ever had asthma?” Current asthma was defined as a “yes” response to the question, “Do you have asthma or spastic bronchitis?” Current wheezing, speech limitation, dry cough at night, and wheezing with exercise were defined as a “yes” response to the following questions respectively: “Have you had any wheezing or whistling in the chest in the last 12 months?”; “In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths?”; “In the last 12 months, have you had a dry cough at night, apart from a cough associated with cold or chest infection?”; “In the last 12 months, has your chest sounded wheezy during or after exercise?”¹⁵

Corresponding questions about the child were included in the parental interview.

Analysis

Prevalence rates of current and lifetime asthma, current wheezing, and other asthma symptoms were calculated separately according to the responses of the adolescents and the parents. To calculate the overall percent agreement, we summed the number of questions in which both adolescents and parents agreed, divided this by the total number of responses and multiplied the result by 100 to yield a percentage.

The Chi-square test was used to compare reported rates of asthma and asthma symptoms, between Jewish and Arab adolescents, and between Jewish and Arab parents; and to compare parental and adolescent self-reports within each population group. A P value < 0.05 was considered significant. Chance-corrected agreement was assessed with Cohen’s kappa coefficient.¹⁶ Kappa values were interpreted as follows: < 0 , poor agreement; 0–0.20, slight agreement; 0.21–0.40, fair agreement; 0.41–0.60, moderate agreement; 0.61–0.80, substantial agreement; 0.81–1.00, almost perfect agreement.¹⁷

A sub-analysis of chance-corrected agreement regarding asthma symptoms was performed for pairs in which both the adolescent and the parent reported lifetime asthma.

Kappa values of two independent samples (Jews and Arabs) were compared by the two-sample Z -test, assuming the normal distribution to be a good approximation for the distribution of the kappa in each sample, due to the large sample size. $Z = (\text{kappa}_{\text{Jews}} - \text{Kappa}_{\text{Arabs}}) / \sqrt{(\text{var}_{\text{Jews}} + \text{var}_{\text{Arabs}})}$. $Z > Z_{\alpha/2}$ ($\alpha = 0.05$ and $Z_{\alpha/2}$

ABBREVIATIONS:

ISAAC International Study of Asthma and Allergies in Childhood

2 = 1.96) was the criterion for rejecting the null hypothesis of no difference between the kappa values of Jews and Arabs.¹⁸

All statistical analyses were performed with the SAS package, version 9.1 (SAS, Cary, NC).

RESULTS

Characteristics of the Study Population

The questionnaires were distributed and completed by 694 adolescents. Parent interviews were completed by 327 Jewish parents and 335 Arab parents. Thirty-two adolescents whose parents did not respond to the survey were excluded from the analysis.

Table 1 summarizes the characteristics of the study groups. The Jewish group included 145 boys (44.5%) and 181 girls (55.5%) of mean age 14.2 ± 0.4 years. The Arab group included 119 boys (36.1%) and 211 girls (63.9%) of mean age 14.1 ± 0.3 years. Compared to the Jewish group, the Arab group had significantly larger families (more siblings), higher rates of positive family history of asthma and paternal smoking, and a lower rate of maternal smoking. In both groups, the mother was the parent more often interviewed (88.3% among Jews and 84.3 % among Arabs).

Prevalence Rates

Table 2 presents the prevalence of asthma and asthma symptoms according to the adolescents' and parents' responses. Based on adolescent reports, rates of current asthma and asthma symptoms were not significantly different between Jews and Arabs. For example, rates of wheezing in the last 12 months were 13.7% among Jews and 10.2% among Arabs ($P = 0.17$); and the rates of speech limitation due to wheezing were 6.4% and 7.0%, respectively ($P = 0.61$). Based on the parents' reports, rates were higher among Jewish than Arab adolescents for lifetime asthma (21.4% and 12.9%, respectively, $P < 0.01$), dry cough at night (12.2% and 3.9% respectively, $P < 0.01$) and wheezing during exercise (7.3% and 3.0% respectively, $P = 0.01$).

In the Jewish population, parents reported lifetime asthma more often than did adolescents (21.4% vs. 15.4%, $P = 0.05$), and adolescents reported asthma symptoms (wheezing in the last 12 months, speech limitation due to wheezing, dry cough at night, and wheezing with exercise) significantly more often than did their parents. Current asthma was also reported more often by the adolescents, but the difference from the parents' reports was not statistically significant (7.5% vs. 5.5%, $P = 0.34$). Reports by Arab parents and adolescents

TABLE 1—Characteristics of the Study Participants by Population Group

	Jews (N = 327)	Arabs (N = 335)	P
Sex			
Male	145 (44.5)	119 (36.1)	0.03
Female	181 (55.5)	211 (63.9)	
Parent interviewed			
Mother	286 (88.3)	282 (84.4)	0.15
Father	38 (11.7)	52 (15.6)	
First born			
Yes	107 (33.9)	102 (37.8)	0.98
No	209 (66.1)	200 (66.2)	
Paternal education*			
>12 years	90 (28.3)	83 (25.0)	0.38
≤12 years	228 (71.7)	249 (75.0)	
Maternal education*			
>12 years	96 (29.9)	120 (36.1)	0.09
≤12 years	225 (70.1)	212 (63.7)	
Maternal smoking*			
Yes	53 (16.5)	23 (7.0)	<0.01
No	269 (83.5)	306 (93.0)	
Paternal smoking*			
Yes	111 (34.7)	186 (56.5)	<0.01
No	209 (65.3)	143 (43.5)	
Family history of asthma*			
Yes	55 (16.8)	74 (22.1)	<0.01
No	272 (83.2)	261 (77.9)	
Age (yr), mean ± SD	14.2 ± 0.4	14.1 ± 0.3	<0.01
Number of siblings, mean ± SD	2.2 ± 1.2	3.5 ± 2.8	0.01

Values are n (%) unless otherwise indicated.

*Based on parental reports.

TABLE 2—Prevalence of Asthma and Asthma Symptoms Among Jews and Arabs: Adolescent and Parental Reports

Variable	Jews (%)		<i>P</i>	Arabs (%)		<i>P</i>	<i>P</i> 1	<i>P</i> 2
	Adolescents	Parents		Adolescents	Parents			
Lifetime asthma	15.4	21.4	0.05	13.6	12.9	0.72	0.56	<0.01
Current asthma	7.5	5.5	0.34	8.4	3.9	0.03	0.72	0.32
Wheezing in last 12 months	13.7	6.4	<0.01	10.2	4.5	<0.01	0.17	0.27
Speech limitation due to wheezing	6.4	1.5	<0.01	7.0	3.3	0.03	0.61	0.15
Dry cough at night	25.5	12.2	<0.01	23.7	3.9	<0.01	0.79	<0.01
Wheezing with exercise	12.8	7.3	0.03	12.2	3.0	<0.01	0.89	0.01

P: For comparison between parents and adolescents in the same population group.

*P*1: For comparison between Jewish adolescents and Arab adolescents.

*P*2: For comparison between Jewish parents and Arab parents.

on lifetime asthma were not significantly different (12.9% and 13.6%, respectively). Arab adolescents reported current asthma (8.4% vs. 3.9%, $P=0.03$) and asthma symptoms significantly more often than did their parents.

Level of Agreement

Table 3 shows the level of agreement between adolescent and parental reports. In the Jewish group, the level of absolute adolescent-parent agreement was high for current asthma (96.1%) and lifetime asthma (86.1%), and the corresponding chance-corrected agreement was moderate (kappa 0.59 and 0.53, respectively). For wheezing in the last 12 months, the level of absolute agreement was high (88.5%), and the corresponding chance-corrected agreement was fair (kappa 0.38). For asthma symptoms (speech limitation due to wheezing, dry cough at night, and wheezing with exercise), the chance-corrected agreement was slight (kappa 0.06–0.23).

In the Arab group, the level of absolute adolescent-parent agreement was high for current asthma (96.7%), and the corresponding chance-corrected agreement was

moderate (kappa 0.52). For lifetime asthma, the level of absolute agreement and chance-corrected agreement were lower (87% and kappa 0.44, respectively). Regarding wheezing in the last 12 months, the level of absolute agreement was high (89.5%) but the chance-corrected agreement was slight (kappa 0.28). For speech limitation due to wheezing, absolute agreement was high (91.0%) but chance-corrected agreement was slight (kappa 0.08); for dry cough at night, chance-corrected agreement was slight (kappa 0.09), and for wheezing with exercise, chance-corrected agreement was fair (kappa 0.27).

Table 4 presents the comparison of the kappa values between Jews and Arabs. There were no statistically significant differences in the levels of chance-corrected agreement between Jews and Arabs in any of the studied parameters. There were no statistically significant differences in chance-corrected agreement by sex, parental education, parental smoking habits, history of asthma in the family, having an older sibling, or number of siblings (data not shown).

TABLE 3—Level of Agreement Between Adolescent and Parent Reports Among Jews and Arabs

Variable	Parent/adolescent response, n (%)				Percent agreement	Kappa
	Yes/Yes	Yes/No	No/Yes	No/No		
Jews						
Lifetime asthma	36 (11.4)	31 (9.8)	13 (4.1)	237 (88.4)	86.1	0.53
Current asthma	13 (4.0)	5 (1.5)	11 (3.4)	297 (91.1)	96.1	0.59
Wheezing in last 12 months	14 (4.4)	7 (2.2)	30 (9.4)	270 (84.1)	88.5	0.38
Speech limitation due to wheezing	1 (0.3)	4 (1.3)	18 (5.6)	296 (92.8)	93.1	0.06
Dry cough at night	17 (5.3)	22 (6.9)	62 (19.3)	220 (68.5)	73.8	0.15
Wheezing with exercise	10 (3.1)	14 (5.0)	31 (9.6)	268 (83.0)	86.1	0.23
Arabs						
Lifetime asthma	23 (7.0)	20 (6.4)	23 (7.0)	265 (80.1)	87.0	0.44
Current asthma	11 (3.3)	2 (0.60)	16 (4.8)	305 (91.3)	96.7	0.52
Wheezing in last 12 months	8 (2.4)	7 (2.1)	26 (7.9)	289 (87.6)	89.5	0.28
Speech limitation due to wheezing	2 (8.3)	8 (2.4)	22 (6.6)	300 (90.4)	91.0	0.08
Dry cough at night	7 (2.1)	6 (1.8)	72 (21.6)	248 (74.5)	76.6	0.09
Wheezing with exercise	8 (2.4)	2 (0.6)	33 (9.9)	289 (87.1)	89.5	0.27

TABLE 4—Comparison of Chance Corrected Agreement Between Adolescent and Parent Reports Among Jews and Arabs

Variable	Kappa (95% CI) Jews	Kappa (95% CI) Arabs	<i>P</i>
Lifetime asthma	0.53 (0.41–0.65)	0.44 (0.30–0.58)	0.33
Current asthma	0.59 (0.41–0.77)	0.52 (0.33–0.71)	0.60
Wheezing in last 12 months	0.38 (0.22–0.53)	0.28 (0.10–0.45)	0.60
Speech limitation due to wheezing	0.06 (–0.09–0.20)	0.08 (0.0–0.22)	0.85
Dry cough at night	0.15 (0.03–0.26)	0.09 (0.001–0.18)	0.42
Wheezing with exercise	0.23 (0.08–0.38)	0.27 (0.11–0.43)	0.72

Lifetime asthma was reported by 36 adolescent-parent pairs in the Jewish group and by 23 adolescent-parent pairs in the Arab group. Analysis of the Jewish subgroup showed kappa values for adolescent and parent agreement of 0.48 for wheezing in the last 12 months, 0.08 for speech limitation due to wheezing, 0.23 for dry cough at night, and 0.18 for wheezing with exercise. Corresponding kappa values in the Arab subgroup were 0.55, 0.24, 0.42, and 0.37. There were no statistically significant differences in the kappa values between Jews and Arabs, in this analysis (*P* values: 0.76, 0.43, 0.58, and 0.42).

DISCUSSION

The present study compared the responses of adolescents and their parents to the ISAAC questionnaire. In both the Jewish and Arab groups, prevalence rates of current asthma and asthma symptoms were significantly higher when reported by the adolescents themselves than by their parents. Among Jews, lifetime asthma was reported more frequently by parents than adolescents; among Arabs, rates reported by parents and adolescents were the same. According to the adolescent reports, the prevalence of current asthma was lower, though without statistical significance, among Jews than Arabs (7.5% vs. 8.4%). However, based on parental reports, the prevalence was higher among Jews, though without statistical significance (5.5% vs. 3.9%). This finding supports a recent study that showed increasing rates among Arabs and stable rates among Jews.¹⁹

Prompted by earlier documentations of differences between the Arab and Jewish populations in health behaviors and in the reporting of health-related issues,^{20,21} we examined adolescent-parent agreement in each population group. The kappa values for lifetime asthma and current asthma were higher (moderate) than the kappa values for asthma symptoms (fair), among both Arabs and Jews. There was no statistically significant difference between Jews and Arabs regarding the overall chance-corrected agreements. The study indicates that levels of agreement between adolescents and their parents were similar in the Arab and Jewish populations.

Our findings concur with studies from other countries that showed adolescents to report a higher prevalence of

asthma symptoms than their parents,^{7–9} with the exception of lifetime asthma, which was reported more often by parents.^{4,7} It is possible that children are less aware than their parents of their medical histories (lifetime asthma); yet, as they grow and spend less time with their parents, parental knowledge of occasional symptoms and signs decreases. Additionally, adolescents may understand or interpret questions such as “Do you have speech limitation due to wheezing?” differently from their parents.

Previous studies that used the ISAAC questionnaire reported higher kappa values, for agreement between parents and adolescents, than those reported here in, regarding lifetime asthma, ranging from 0.68 to 0.80,^{4,6,7} and for current asthma, from 0.65 to 0.76.^{4,8} As in the present study, others reported levels of agreement for asthma symptoms that were fair or moderate: wheezing, kappa 0.44–0.48^{8,7}; speech limitation due to wheezing, kappa 0.51⁷; and wheezing after exercise, kappa 0.39.⁷ One study reported only slight agreement, with kappa values of 0.20 and 0.11 for current wheezing and speech limitation due to wheezing, respectively.⁴

We report poor to moderate kappa values for our sub-analysis of the adolescent-parent pairs that were concordant for lifetime asthma. This suggests that even when there is agreement between parents and their adolescent children regarding the diagnosis of asthma, the parents may not be fully aware of current asthma symptoms. Thus, when standardized questionnaires for asthma are used, differences between adolescent and parental reports may be expected due to factors that involve perception and interpretation, such as regarding wheezing during the last 12 months and speech limitation due to wheezing.

We found no statistically significant differences in chance-corrected agreement between boys and girls, or by family history of asthma. A tendency toward higher child-parent agreement for girls in families with a history of asthma was previously reported.⁷

The main limitation of the present study was the absence of an objective measure of asthma. Nonetheless, the validity of the adolescents' reports is supported by their similarity to results obtained in our 2008 and 2009 studies, which interviewed adolescents of a similar population.¹⁹

In conclusion, in both population groups, Jews and Arabs, adolescents more often reported asthma and asthma symptoms. This seems to be a cross-cultural phenomenon. Therefore, particular attention should be paid to the source of information when comparing prevalence rates of asthma symptoms across studies.

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