

EMAIL

Bestelldatum: 2013-11-06 11:33:31

BSB Bayerische
Staatsbibliothek

NORMAL

Kopie

SUBITO-2013110600876



Faculty of Medicine
Library
Ms Bosa Licul
Brace Branchetta 20
51 000 Rijeka
KROATIEN

Ben.-Gruppe: USER-GROUP-8
Tel: +385 51651123
Mail: Bosa.Licul@medri.hr

Fax:

Subito-Kundennummer:
SLI02X01071E
Subito-Bestellnummer:
SUBITO-2013110600876

4 Z 79.281 Hbzs 750-24 a = Neueste Hefte

Jahrgang: 2013

Band/Heft: 50

Seiten: 810-14

Verfasser: Banac, S.

Titel: Rising trends in the prevalence

Journal of asthma
ISSN: 0277-0903

Bemerkung:

Beschreibung:

Die Abrechnung dieser Lieferung erfolgt über die subito-Zentralregulierung

Bei Rückfragen wenden Sie sich bitte innerhalb von 10 Tagen an die Bayerische Staatsbibliothek, Direktlieferdienste
Tel. ++49 89 28 638-26 43, doklief@bsb-muenchen.de

Wir weisen den Empfänger darauf hin, dass Sie nach geltendem Urheberrecht die von uns übersandten Vervielfältigungsstücke ausschließlich zu Ihrem privaten oder sonstigen Gebrauch verwenden und weder entgeltlich noch unentgeltlich in Papierform oder als elektronische Kopien verbreiten dürfen.

S01_0078546

EPIDEMIOLOGY

Rising trends in the prevalence of asthma and allergic diseases among school children in the north-west coastal part of CroatiaSrđan Banac¹, Vojko Rožmanić², Koraljka Manestar², Zrinka Korotaj-Rožmanić³, Kristina Lah-Tomulić¹, Ivana Vidović⁴, Marta Šerer⁴, Nastasja Švraka⁴, and Tamara Petrić⁴¹Department of Pediatrics, Clinical Hospital Center Rijeka, Rijeka, Croatia, ²Department of Pediatrics, School of Medicine, University of Rijeka, Rijeka, Croatia, ³Department of Psychology, Clinical Hospital Center Rijeka, Rijeka, Croatia, and ⁴School of Medicine, University of Rijeka, Rijeka, Croatia**Abstract**

Objective: To estimate time trends in prevalence of symptoms and reported diagnosis related to asthma, allergic rhinitis/conjunctivitis and eczema among school children in the north-west coastal part of Croatia. **Methods:** Results of two identical cross-sectional surveys conducted on the same area 8 years apart (school years 2001/02 versus 2009/10) in complete adherence to the protocol of the International Study of Asthma and Allergies in Childhood were compared. Surveyed population comprised two age groups: 6–7 years ($n = 1634$ versus $n = 1052$) and 13–14 years ($n = 2194$ versus 1181). **Results:** Significant ($p < 0.001$) increases in prevalence (%) of symptoms related to asthma (8.4 versus 14.0), allergic rhinitis (17.5 versus 25.6), allergic rhinoconjunctivitis (6.7 versus 15.3) and eczema (3.4 versus 5.9) were observed in the 13–14-year-olds. In the 6–7-year-olds there were observed significant ($p < 0.001$) increases in prevalence of symptoms of eczema (5.4 versus 8.7) and allergic rhinitis (16.9 versus 22.1) whereas prevalence of symptoms related to asthma (9.7 versus 9.4; $p = 0.398$) and allergic rhinoconjunctivitis (5.6 versus 6.8; $p = 0.102$) showed to be stable. Significant increases in prevalence of reported diagnosis were observed for asthma (5.2 versus 6.9; $p = 0.02$) and hay fever (10.5 versus 14.6; $p < 0.001$) in the older, and for eczema (10.6 versus 14.1; $p < 0.001$) in the younger age group. **Conclusion:** Prevalence of asthma and allergic diseases among the school children living on the surveyed area showed a rising trend.

Keywords

Allergy, child, eczema, epidemiology, rhinitis

History

Received 1 January 2013

Revised 22 April 2013

Accepted 2 May 2013

Published online 20 June 2013

Introduction

A unique multi-centre epidemiological research programme called the International Study of Asthma and Allergies in Childhood (ISAAC) was established in 1991 in answer to a disturbing worldwide increase in the prevalence of allergic diseases affecting children over the last several decades. ISAAC was carried out in three phases in order to demonstrate the overall distribution of childhood asthma, allergic rhinitis and eczema (Phase One), to elucidate the factors affecting their prevalence (Phase Two) and to assess further time trends in their prevalence and severity (Phase Three). Moreover, ISAAC provided a uniform standardized epidemiological methodology which enabled the obtained data to be comparable throughout the world [1]. ISAAC Phase Three was a repetition of the original Phase One studies after at least 5 years, and their results in more countries showed increases in prevalence in all three disorders more often than showing decreases, but in most countries changes were mixed [2].

There were a few recent epidemiological surveys according to ISAAC Phase One or Phase Two conducted in Croatia. Comparison of their results suggested that Croatia is a

country with a moderate prevalence of allergic diseases among the pediatric population (Table 1). However, there were no specific studies performed to check whether a general impression and speculative conclusions about a substantial prevalence increase of allergic diseases in Croatia are true [3,8].

Therefore, the aim of this study was to estimate the time trends in the prevalence of symptoms and reported diagnosis related to asthma, allergic rhinitis, allergic rhinoconjunctivitis and eczema among school children in the Primorsko-Goranska County in Croatia. It is a coastal region characterized by Mediterranean climate and very good health care facilities. Results of two identical cross-sectional surveys using ISAAC methodology and conducted on the same area 8 years apart were compared.

Participants and methods

The first study was conducted during the school year 2001/02 (ISAAC Phase One) and the second one during the school year 2009/10 (ISAAC Phase Three). Both surveys were conducted in complete adherence to the protocol of the worldwide accepted and elsewhere described ISAAC methods [1]. Briefly, data were collected using the standardized ISAAC written questionnaire about the current (in the last 12 months) presence of symptoms related to asthma (wheezing),

Table 1. Current prevalence rates of symptoms related to asthma (wheezing), allergic rhinitis (nasal symptoms), allergic rhinoconjunctivitis (eyes affected) and eczema (itchy rash) in Croatian school children according to studies using ISAAC methodology and conducted during the period 2001–2008.

Region studied (ref)	PGC ^a [3]	ZGB ^b [4]	MC ^c [5]	PSC ^d [6]	BPC ^e [7]
Study year	2001/02	2001/02	2004/05	2006/07	2007/08
Sample (n)	2194	1047	3111	559	1684
Age group (years)	13–14	10–11	12–14	11–14	10–11
	Prevalence of symptoms in the last 12 months (%)				
Wheezing	8.4	6.0	5.1	14.3	7.9
Nasal symptoms	17.5	12.1	10.9	18.6	19.2
Eyes affected	6.7	7.6	7.1	9.8	9.9
Itchy rash	4.8	7.8	5.3	8.2	10.0

^aPrimorsko-Goranska County, ^bCity of Zagreb, ^cMeđimurska County, ^dPožeško-Slavonska County, ^eBrodsko-Posavska County.

Table 2. Descriptive statistics of surveyed school children populations.

Region studied	Primorsko-Goranska County			
	Study year	2001/02	2009/10	
Age group (years)		6–7	13–14	6–7
Subjects invited (n)		2036	2442	1345
Subjects participated (n)		1634	2194	1052
Response rate (%)		80.3	89.8	78.2
Girls (%)		51.4	51.9	51.6

allergic rhinitis (sneezing, runny or blocked nose apart from cold or flu), allergic rhinoconjunctivitis (nasal symptoms accompanied by itchy-watery eyes) and eczema (prolonged itchy rash, flexural areas affected), and about the cumulative (ever in life) prevalence of reported diagnosis of asthma, hay fever and eczema. The surveyed population comprised two age groups of school children (Table 2). The written questionnaire was completed by the 13–14-year-old children and by the parents of the 6–7-year-olds. There was also a video questionnaire about the presence of wheezing as a key symptom for epidemiological detection of asthma. The video questionnaire was completed only by 13–14-year-olds.

Randomly selected elementary schools located in the surveyed region were used as sampling units. Primorsko-Goranska County is a well-defined area from the administrative point of view and from the aspects of organization of health service. Although some rural areas were included, subjects from urban areas do predominate. The sample size of at least 1000 per age group was estimated to provide sufficient statistical power for the calculation of prevalence. The prevalence rates were calculated by dividing the number of positive responses to each question by the number of completed questionnaires. Z-test was used for comparison of prevalence rates. Asthma prevalence and its relation to gender was additionally analysed. Chi-square test was used to assess the difference in sex distribution. Two-sided *p* values <0.05 were considered statistically significant.

Results

Age group 13–14 years

Among subjects in the older age groups, during the period between school years 2001/02 and 2009/10, there was observed a significant increase in the current prevalence of all the symptoms related to asthma, allergic rhinitis, allergic

rhinoconjunctivitis and eczema as well as the lifetime prevalence of reported diagnosis of these conditions. The only exception was the lifetime prevalence of reported diagnosis of eczema which seems to remain stable. Calculated current prevalence rates of symptoms related to asthma, allergic rhinitis and allergic rhinoconjunctivitis showed a striking rise in particular. Consistent with these findings was also a modest but significant increase in the current prevalence of wheezing documented by answers to the video questionnaire (Table 3).

Age group 6–7 years

In contrast to the older age group, during the same period, there were no significant increases in the prevalence rates neither of symptoms related to asthma nor of the reported diagnosis of asthma and hay fever among subjects in the younger age group. While there was a moderate and significant increase in the prevalence rates of symptoms related to allergic rhinitis, such statistically significant trend was not recorded for symptoms related to allergic rhinoconjunctivitis. Significant increases in the prevalence rates were observed as for symptoms of eczema as for its reported diagnosis (Table 3).

Asthma prevalence by sex

Current wheeze was more often observed in boys among subjects in the younger age groups in both study years. Inversely, girls tended to have current asthma symptoms more often in the older age groups. Lifetime prevalence of reported asthma diagnosis, however, showed a male sex predominance in both study years and in both age groups. According to the video questionnaire, frequency of current asthma symptoms in the older age groups were equally distributed among both sexes in both studies (Table 4).

Table 3. Current (in the last 12 months) prevalence rates of symptoms related to asthma, allergic rhinitis, allergic rhinoconjunctivitis and eczema and lifetime prevalence rates of reported diagnosis of these conditions according to age groups of school children in the region of Primorsko-Goranska County. Comparison of results of the two identical studies conducted on the same area 8 years apart.

Age group (years)	6-7		<i>p</i> Value	13-14		<i>p</i> Value
	2001/02 Sample (<i>n</i>)	2009/10 Sample (<i>n</i>)		2001/02 Sample (<i>n</i>)	2009/10 Sample (<i>n</i>)	
	Prevalence (%)			Prevalence (%)		
In the last 12 months						
Wheezing	9.7	9.4	0.398	8.4	14.0	<0.001
Wheezing (video)	-	-	-	4.6	6.4	0.013
Nasal symptoms	16.9	22.1	<0.001	17.5	25.6	<0.001
Eyes affected	5.6	6.8	0.102	6.7	15.3	<0.001
Itchy rash	6.1	10.1	<0.001	4.8	7.0	<0.001
Flexural areas affected	5.4	8.7	<0.001	3.4	5.9	<0.001
Ever in life						
Asthma ^a	3.9	5.0	0.086	5.2	6.9	0.02
Hay fever ^a	5.3	5.4	0.455	10.5	14.6	<0.001
Eczema ^a	10.6	14.1	<0.001	8.5	8.3	0.421

Table 4. Sex distribution of subjects in relation to current presence of asthma symptoms and to lifetime presence of reported diagnosis of asthma.

Study year	2001/02		<i>p</i> Value	2009/10		<i>p</i> Value
	Boys	Girls		Boys	Girls	
Age group 6-7 years (<i>n</i>)						
Total	794	840		509	543	
Wheezing last 12 months	97	62	0.023	63	36	0.086
Asthma ever in life	40	24	0.092	34	19	0.025
Age group 13-14 years (<i>n</i>)						
Total	1055	1139		601	580	
Wheezing last 12 months	86	99	<0.001	75	90	0.449
Wheezing (video)	52	49	0.163	37	39	0.929
Asthma ever in life	61	54	0.879	61	20	<0.001

Discussion

The general opinion about a substantial increase in prevalence of allergic diseases among Croatian children was mostly based on a crude chronological comparison of results of a few older prevalence studies of asthma, allergic rhinitis and pollinosis conducted during the last two decades of the past century [3,8]. In fact, their results cannot be properly compared because different study designs and methodologies, including the use of self-created non-standardized questionnaires or just searching for diagnosis through medical records, were applied by investigators [9-13]. Thus, a reliable evidence for a hypothesized increase in the prevalence of asthma and allergic diseases among Croatian children has still been lacking. In spite to the several ISAAC studies that have been completed in Croatia during the period from 2001 to 2008 (Table 1), there were no surveys performed in the same population on the same area at different time points. The exception is the present study whose strength includes the use of standardised ISAAC methodology that was duplicated in repeat cross-sectional surveys. On the other hand, this study of trends in prevalence included two surveys of a pure descriptive nature. There were no elements of analytical epidemiology which are usually desirable to be included. It may present a certain weakness of this study.

The results of the present study have mostly confirmed a general impression about an increase in the prevalence of

symptoms related to all the three diseases, at least in the north-west coastal region of Croatia. All the changes in symptoms prevalence were recorded in the same increasing direction except the prevalence of symptoms related to asthma in the younger age group which seems to be stagnant. Worldwide comparable population estimates of direction and size of change in prevalence of symptoms of these diseases reported by the ISAAC Phase Three Study Group showed that most research centers documented a significant change in prevalence for at least one disorder, with increases being more common than decreases, and occurring more commonly in the younger age-group. However, the research centers with high asthma prevalences reported more commonly a decreasing trend in the prevalence of asthma symptoms in the older age-group [2].

The possible explanations of results of the present study considering the time trends in prevalence of symptoms related to asthma, allergic rhino/conjunctivitis and eczema seem to be quite challenging. A remarkable increase in prevalence of current symptoms related to these disorders, especially observed in the older age group of subjects, certainly indicates that trends of potential risk factors should be studied parallel to trends in disease. The results of ISAAC Phase One showed large worldwide variations in the symptom prevalence of asthma, rhinoconjunctivitis and eczema, with up to 10- to 20-fold variations between countries around the world, even in genetically similar groups. These findings suggested that

environmental rather than genetic factors may underlie observed variations [14]. Further studies were undertaken by ISAAC collaboration in order to elucidate which potentially protective or risk environmental factors such as dietary and climatic factors, tuberculosis, pollen and tobacco exposure, immunisation rates, antibiotic and paracetamol use, and country level economic development, are associated with asthma and allergic diseases in childhood. These ecological analyses in both age groups demonstrated mostly weak relationships of small magnitude between environmental variables and current symptoms of the diseases, or no association at all. Investigators were not able to tell which factors were relevant to causation of these diseases [15].

There are few studies investigating relationship between environmental factors and childhood allergies in Croatia. The study conducted among a population of 10-year-olds in the city of Zagreb showed a positive skin reactivity to inhalant allergens in more than a half of 384 tested subjects. The most common allergen responsible was house dust mite [16]. Such a high prevalence of allergic sensitization which exceeded by far the prevalence of allergic symptoms documented in the same population may suggest that the striking increase in prevalence of symptoms of asthma, allergic rhinoconjunctivitis and eczema observed in the older age group of the present study could be influenced by a variety of potential risk factors associated with the phenomenon of allergic sensitization. Damp environment with moulds, fungi and carpets in bedrooms together with exposure to tobacco smoke, especially maternal smoking, seemed to be identified as risk factors for asthma and allergies in Croatian children [7,17]. There are also disturbing data from the report of the European School Survey Project on Alcohol and other Drugs (ESPAD) about the 30-day prevalence of smoking among 15–16-year-old Croatian students which was much higher (38%) than the ESPAD average (29%) in 2007 [18].

Since males account for most asthmatics in the prepubertal ages, whereas new cases of asthma in adolescence are predominantly females, the results of sex distribution among subjects in relation to prevalence of current asthma symptoms and age groups were expected. This epidemiological pattern did not show changes between the two study years. However, according to the ESPAD report of Croatian results there was recorded a significant increase in smoking prevalence in particular among girls from 19% to 26% during the period 1995–2007, respectively [18].

The prevalence of current asthma symptoms in the younger age group was similar in 2001/02 and 2009/10. This finding is in line with some other reports suggesting that substantial increase of asthma prevalence has plateaued, or may now be even declining, in parts of the developed world [19]. On the other hand, a recent systematic review of higher quality epidemiological studies has clearly shown that there is overall no decline in the prevalence of asthma. The available data suggest that in most parts of the world asthma prevalence is continuing to increase, or is remaining stable. Asthma is still predominantly a western English-speaking area disease but people in all world regions are nonetheless now affected [20].

The recorded lifetime prevalence of reported diagnosis of asthma, which is widely considered as an indicator of physician-diagnosed condition, showed a rising trend in

both age groups in contrast to the stable prevalence of current asthma symptoms observed in the younger age group. This may indicate that observed rising trend of lifetime prevalences are partly a result of increased professional alertness and diagnostic activity. Furthermore, stable current prevalences of symptoms of asthma and allergic rhinoconjunctivitis (nasal symptoms with eyes affected), as well as lifetime prevalence of hay fever documented in the younger age group certainly suggest that allergic sensitization, especially on pollen allergens, is not so prominent risk factor in 6–7-year-olds. These data also demonstrate that all wheeze is not asthma and that all suspected nasal symptoms do not have allergic origin in this age group of children. Rhinitis as a single symptom of allergy is somewhat less specific than rhinoconjunctivitis as it is often triggered by infections, air quality and physical stimuli. Thus, the combination of nasal symptoms with eyes affected seems to be more reliable indicator of allergic rhinitis for epidemiological identification and comparison [21]. Considering the stagnant lifetime prevalence of reported diagnosis of eczema observed in the older age group of the present study we believe that this result is influenced by a strong age-related clinical presentation of this disease.

Conclusion

The comparison of results of repeated cross-sectional surveys conducted 80 years apart among school children in the north-west coastal part of Croatia confirmed a significant rising trend in the prevalence of asthma, allergic rhinitis, allergic rhinoconjunctivitis and eczema. Time trends of potential risk factors, especially those associated with allergic sensitization and tobacco smoke exposure, need to be simultaneously studied with the trends in prevalence of these diseases.

Acknowledgements

We would like to thank all the collaborators in the participating schools including parents, children and their teachers.

Declaration of interest

The authors have not any financial, consulting and personal relationship with other people or organizations that could influence the authors work. Authors are not under any affiliation with organization that has a direct interest in the subject matter or material discussed.

The study was partly supported by the grant of the Croatian Ministry of Science Education and Sports, Projects No. 062-0620228-0192 and No. 062-0620228-0198.

References

1. Asher MI, Keil U, Anderson HR, et al. International study of asthma and allergies in childhood (ISAAC): rationale and methods. *Eur Respir J* 1995;8:483–91.
2. Asher MI, Montefort S, Björkstén B, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multicountry cross-sectional surveys. *Lancet* 2006;368:733–43.

3. Banac S, Lah-Tomulić K, Ahel V, et al. Prevalence of asthma and allergic diseases in Croatian children is increasing: Survey study. *Croat Med J* 2004;45:721–6.
4. Stipić-Marković A, Pevec B, Radulović-Pevec M, Čustović A. Prevalence of symptoms of asthma, allergic rhinitis, conjunctivitis and atopic eczema: ISAAC in a population of school children in Zagreb [in Croatian]. *Acta Med Croatica* 2003;57:281–5.
5. Munivrana H, Vorko-Jovic A, Munivrana S, et al. The prevalence of allergic diseases among Croatian school children according to the ISAAC Phase One questionnaire. *Med Sci Monit* 2007;13:505–9.
6. Drkulec V, Tesari H, Tomić-Rajić M, et al. The prevalence of asthma, allergic rhinitis/rhinoconjunctivitis and atopic eczema among Croatian school children in Požeško-Slavonska County (ISAAC phase I). In: Stipić-Marković A, Čvorišćec B, ed. *Proceedings of the 1st Croatian Congress of Allergology and Clinical Immunology*. 2009 May 21–23; Zagreb, Croatia. p. 19.
7. Aberle N, Kljaić-Bukvić B, Blekić M, et al. ISAAC II: Prevalence of allergic diseases and risk factors for asthma in childhood in the region of Brodsko-Posavska County. In: Stipić-Marković A, Čvorišćec B, eds. *Proceedings of the 1st Croatian Congress of Allergology and Clinical Immunology*. 2009 May 21–23; Zagreb, Croatia. p. 21–23.
8. Stipić-Marković A, Čvorišćec B, Pevec B, Radulović-Pevec M. Increasing incidence of allergy in Croatia. *Rad Medical Sciences*, Zagreb 2008;499:105–16.
9. Kolbas V, Lokar R, Stanić M, Krznarić-Sučić Z. Prevalence of asthma in Zagreb school children [in Croatian]. *Arhiv za zaštitu majke i djeteta* 1979;23:351–63.
10. Restović-Sirotković M. Presentation of 12 years work of the allergopulmonary division of the schools' polyclinic in Split [in Croatian]. *Paediatrica Croatica* 1993;37:75–81.
11. Banac S. Prevalence of allergic childhood asthma on the islands of Cres-Lošinj. *Paediatrica Croatica* 1994;38:7–13.
12. Aberle N, Reiner-Banovac Z. Epidemiological examination of asthma in children [in Croatian]. *Paediatrica Croatica* 1998;42:9–14.
13. Kavurić-Hafner C, Matika-Šetić A. Features of hay fever in Istrian children [in Croatian]. *Paediatrica Croatica* 1996;40:29–34.
14. ISAAC. Steering Committee: Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. *Lancet* 1998;351:1225–32.
15. Asher MI, Stewart AW, Mallol J, et al. Which population level environmental factors are associated with asthma, rhinoconjunctivitis and eczema? Review of the ecological analyses of ISAAC Phase One. *Respir Res*. 2010;11:8. Available from: <http://respiratory-research.com/content/11/1/8>.
16. Stipić-Marković A, Pevec B, Radulović-Pevec M, et al. Skin reactivity to inhalant allergens in Zagreb school children. *Period Biol* 2007;109:161–4.
17. Stipić-Marković A, Pevec B, Radulović-Pevec M, et al. Allergic diseases in relationship with environmental factors in a population of school children in Zagreb, Croatia. *Arh Hig Rada Toksikol* 2004; 55:221–8.
18. Kuzman M, Pejnović Franelić I, Pavić Šimetin I, Pejak M. European school survey project on alcohol and other drugs: report for Republic of Croatia and the city of Zagreb. Zagreb: Hrvatski zavod za javno zdravstvo, Grad Zagreb; 2008. Change in habits among students in period 1995–2007; p. 43.
19. van Schayck CP, Smit HA. The prevalence of asthma in children: a reversing trend. *Eur Respir J* 2005;26:647–50.
20. Anandan C, Nurmatov U, van Schayck OCP, Sheikh A. Is the prevalence of asthma declining? Systematic review of epidemiological studies. *Allergy* 2010;65:152–67.
21. Björkstén B, Clayton T, Ellwood P, et al. Worldwide time trends for symptoms of rhinitis and conjunctivitis: Phase III of the International Study of Asthma and Allergies in Childhood. *Pediatr Allergy Immunol* 2008;19:110–24.