

## SOME RISK FACTORS ASSOCIATED WITH ASTHMA

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**SUMMARY** – The aim of the study was to determine whether the incidence of some risk factors was significantly higher in a group of asthma patients as compared with a control group of asthma-free subjects. The study included 100 asthmatics and 100 nonasthmatic subjects. Data were collected by the methods of interview and questionnaire. Study results indicated a positive association between asthmatics and lower educational level, poorer compliance with the treatment, and more frequent hospitalization for the disease. Atopy was significantly more common among asthmatics as well as in their family members, however, other chronic diseases were significantly less present in asthmatics as compared with the control group. In our opinion, the treatment of asthma should be strictly individualized and based on psychosocial characteristics of each patient in addition to the pulmonary clinical-functional parameters and international guidelines for the management of asthma. It is concluded that in addition to pharmacologic therapy, the management of asthma should also include patient education on the disease and methods of treatment, various psychotherapeutic measures, and self-care techniques.

**Key words:** *Asthma – prevention and control; Asthma – socioeconomic factors; Respiratory hypersensitivity – epidemiology; Risk factors; Self care methods; Patient education methods*

### Introduction

Asthma is a chronic inflammatory airway disease characterized by airway obstruction and airflow limitation on exposure to various triggers. Asthma is a complex disease in which allergic factors and nonallergic triggers (viral infections, irritants, exercise, drugs, aspirin, occupational factors, stress, air pollution) interact and result in bronchial obstruction and inflammation<sup>1</sup>.

Asthma is also a multifactorial disease in which genetic, environmental, psychologic and social factors play a role<sup>2-4</sup>. Epidemiologic studies show that asthma is an acquired condition determined by the environment<sup>5</sup>. Most studies indicate that atopy is a genetically determined risk factor for asthma<sup>6</sup>. Epidemiologic studies have demonstrated that the occurrence of bronchial symptoms is closely related to the amount of allergen present in the environment of allergic patients, for example, mite counts or allergens in house dust<sup>7</sup>.

The asthma morbidity is increasing worldwide and poses a serious and growing problem throughout the world. The reasons for the increase in the prevalence of asthma are poorly understood. It may be due to changes in allergen loads such as occupational allergens<sup>8</sup>, or to the introduction of mites in the indoor environment by insulation of houses and/or the synergic action of air pollution or tobacco smoking with allergen sensitization<sup>9-11</sup>.

Numerous social factors previously associated with the development of asthma, such as house ownership, higher house comfort, separate sleeping rooms, and nonmanual occupation, are no longer associated with the occurrence of bronchial asthma<sup>12,13</sup>. Smoking and exposure to tobacco smoke, commonly connected with lower socioeconomic status, are considered to be related to deterioration of pulmonary function in asthmatics<sup>14</sup>.

The aim of the study was to investigate whether the incidence of risk factors was higher in asthmatics than in the control group of nonasthmatic subjects, and to assess the treatment modalities, treatment compliance, rate of hospitalization and incidence of other chronic diseases in asthmatics.

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## Subjects and Methods

The study included 100 asthma patients treated at the Jordanovac University Hospital for Pulmonary Diseases and 100 age- and sex-matched nonasthmatic control subjects. Data were collected by the method of interview and a questionnaire structured so as to cover the specific study purpose. The questionnaire was filled-out by study subjects following the interview. The first part of the questionnaire consisted of questions on the general characteristics of the patient and his/her family. These data were completed by the examiner based on the interview previously conducted with the patient. In addition to the general data (sex, age), data on the smoking habit, socioeconomic level (education, occupation, number of household members) and family history of allergic disease with asthma were recorded. The second part of the questionnaire included questions on the patient's disease: type of asthma (atopic or nonatopic), general health status, rate of hospitalization for asthma, and method of treatment for asthma.

Statistical data analysis was performed by use of SPSS statistical software,  $\chi^2$ -test and Student's t-test. The level of statistical significance was set at  $p < 0.05$ .

## Results

The mean age in the group of asthmatics and control group of subjects was  $41.7 \pm 14.9$  and  $46.1 \pm 13.6$  years, respectively. There was no significant age or sex difference between the two groups. According to socioeconomic indicators (level of education, occupation, number of family members living in the same household, socioeconomic status), asthmatics had a significantly lower educational level than the group of nonasthmatics. So, as much as 12% of asthmatics and only 3% of control subjects had not pro-

Table 1. Educational structure of study groups

Level of education	Asthmatics (n)	Controls (n)
Elementary 4-grade school	12	4
Elementary 8-grade school	26	27
High school	41	34
College	3	18
University	18	19
Total	100	100

$\chi^2 = 12.626$ ;  $df = 4$ ;  $p = 0.02$

ceeded beyond the four elementary school grades. Only 3% of asthmatics and 17% of control subjects had received college education (Table 1).

The level of education appears to be one of the factors influencing the choice of occupation, and working environment may be a source of factors that can precipitate the occurrence of asthma episodes. According to occupation, there was a higher proportion of high-school and university students (8%) as well as of farmers and housewives (14%) in the group of asthmatics than in the control group of nonasthmatic subjects (1% and 4%, respectively) (Table 2). The rate of retired persons was lower in asthmatics than in the control group (15% vs 30%).

Table 2. Occupational structure of study groups

Occupation	Asthmatics (n)	Controls (n)
High school/university student	8	3
Clerk/self-employed	32	20
Farmer/housewife	14	4
Retired	15	33
Worker/craftsman	31	40
Total	100	100

$\chi^2 = 22.755$ ;  $df = 4$ ;  $p = 0.000$

Patients with a lower level of education would be expected to be less familiar with the facts about their disease and less compliant with the treatment, which should result in a poorer treatment outcome. The results of this study confirmed poorer treatment compliance in the asthmatics, as only 26% of the study asthmatics were found to adhere to the antiasthmatic medication prescribed (Table 3). This led to an increased rate of hospitalization for asthma, i.e. as many as 25% of the asthmatics had been hospitalized on four or more occasions, as compared with only 5% of the control subjects with the same rate of hospitalization (Table 4).

Atopy is considered an important component of asthma. The results of the present study are consistent with this recognition, revealing 24% of atopic subjects among asthmatics and 31% of asthmatics having either parents or relatives affected with atopy, as compared with 7% of atopic controls, 2% of controls with atopic parents and 12% of controls with relatives affected with atopy (Table 5).

General health status of the study patients and control subjects was assessed from other chronic disease comorbidity. Asthmatics were found to have a significantly lower rate of other chronic disease comorbidity than con-

control subjects; as many as 66% of the asthmatics and 30% of control subjects were free from any other chronic disease (Table 6).

for treatment and causing absenteeism from work and school<sup>15</sup>. The current management of asthma, provided it is consistently performed, significantly reduces the symp-

*Table 3. Treatment modalities in study groups*

Study group	Treatment modality				Total
	Pharmacologic	Climate	Hyposensitization	Other	
Asthmatic	26	3	6	65	100
Control	64	0	0	36	100

$\chi^2=93.108$ ;  $df=3$ ;  $p=0.000$

*Table 4. Rate of hospitalization in study groups*

Study group	No. of previous hospitalizations					Total
	None	1	2	3	34	
Asthmatic	36	21	9	9	25	100
Control	33	33	18	12	4	100

$\chi^2=27.718$ ;  $df=3$ ;  $p=0.000$

*Table 5. Allergic diseases in study subjects and their families*

Study group	Allergy in				Total
	study subject	parent	other family member	none	
Asthmatic	24	6	15	55	100
Control	7	2	11	80	100

$\chi^2=21.966$ ;  $df=3$ ;  $p=0.000$

*Table 6. General health status/comorbidity in study groups*

Study group	Comorbidity			Total	
	None	1	2		
Asthmatic	66	18	7	9	100
Control	33	47	15	5	100

$\chi^2=29.518$ ;  $df=3$ ;  $p=0.000$

There were no between-group differences according to smoking habit, response to stress, place of residence, and number of household members.

## Discussion

Because of its ever increasing prevalence, asthma has become not only a considerable health problem but also a serious socioeconomic concern, incurring substantial cost

toms of the disease and improves the quality of life to such an extent that the majority of asthma patients can pursue a normal life and career<sup>16</sup>. Therefore, in addition to pharmacotherapy, the management of asthma should include patient education on his/her disease and methods of treatment and self-care, because appropriate therapy and avoiding causative factors and triggers can significantly reduce asthma morbidity and mortality<sup>17</sup>.

The lower educational level of asthmatics found in this study (12% of asthma patients had only four-grade elementary school) may in part explain their poorer knowledge about the disease, therapy and risk factors, which resulted in their poorer compliance with the treatment. This in turn led to a less efficient disease control, resulting in a higher rate of hospitalization for asthma and higher health care cost. Similar studies in the USA showed a higher mortality and hospitalization rate among urban black and low-income populations<sup>18</sup>. Besides this, poorer compliance of asthmatics with the therapeutic regimen may also be due to the lack of partnership between the patient and the physician, i.e. inadequate patient education provided by the physician.

Epidemiologic studies indicate that household allergens, primarily house dust, are major risk factors for asthma, and that over 85% of asthmatics have positive skin test response to house dust mites. Hence, a reduction of indoor allergens would seem to be a significant step towards asthma treatment and control<sup>19</sup>. Our results along with those from previous studies indicated a higher incidence of allergies among asthmatics and their families than in the control subjects. Thus, patient education on the need of avoiding causative allergens appears to be of paramount importance, as it would improve the control of asthma and reduce the cost of asthma treatment.

The results of the present study revealed asthmatics to tend to be less compliant with the treatment regimen, so only 26% of them adhered to the prescribed antiasthmatic therapy (bronchodilators and inhalation corticosteroids). Poor therapy compliance caused an unsurprisingly high rate of hospitalization for asthma (25% of our asthmatic patients were hospitalized four or more times). This is in consistence with the studies reporting on as much as 85% of health problems in patients suffering from chronic diseases to be in part due to noncompliance with medical advice on preventive and therapeutic measures<sup>20</sup>. One of the reasons for antiasthmatic medical noncompliance may also lie in the clinical course of asthma, characterized by the episodes of difficult breathing of variable duration with in-between periods when patients may feel completely healthy and cease to comply with therapeutic instructions. However, a reason for therapeutic noncompliance among asthmatics can also be found in their psychologic characteristics and specific patterns of behavior, which might be related to the very development of asthma<sup>21-23</sup>.

Following our opinion that asthma is the result of an interaction between biologic and psychologic factors<sup>24</sup>, whereby the intensity of the effect of each individual fac-

tor varies widely among asthmatics, we strongly support the view that the management of asthma should be strictly individually tailored to each patient, based not only on the clinical-functional parameters of the pulmonary function and international guidelines for the management of asthma, but also on the psychosocial characteristics of each individual patient. In addition to current pharmacologic antiasthmatic therapy, such an individualized therapeutic approach should also include patient education on his/her disease and methods of treatment, various psychotherapeutic measures and self-care techniques. It is mandatory that appropriate public health measures to reduce asthma morbidity and mortality be implemented at both primary and secondary level of asthma prevention, which would improve the quality of life of asthmatics and reduce the cost of their treatment.

## References

1. National Asthma Education and Prevention Program. (National Heart, Lung and Blood Institute). Guidelines for the diagnosis and management of asthma: expert panel report 2. Bethesda, MD: U.S. Department of Health and Human Services, 1997; Publ. No. 97-4051.
2. SKADHAUGE LR, CHRISTENSEN K, KYVIK KO, SISGAARD T. Genetic and environmental influence on asthma: a population-based study of 11,688 Danish twin pairs. *Eur Respir J* 1999;13:8-14.
3. POWER C, MATTHEWS S. Origins of health inequalities in a national population sample. *Lancet* 1997;350:1884-9.
4. LIDNY C, WITMOTTE I. Asthma: psychosomatic disease in children and adults (scientific and literary review of the literature). *Rev Med Brux* 1990;11:21-5.
5. BJORKSTEN B. The environment and sensitization to allergens in early childhood. *Pediatr Allergy Immunol* 1997;8 (Suppl 10):32-9.
6. BARNES KC. Atopy and asthma genes – where do we stand? *Allergy* 2000;55:803-17.
7. VERHOEFF AP, van STRIEN RT, van WIJEN HJ, BRUNKREEF B. Damp housing and child respiratory symptoms: the role of sensitization to dust mite and mold. *Am J Epidemiol* 1995;14:103-10.
8. FARNHAM JE. Occupational asthma (see comments). *Tex Med* 1999;95:60-4.
9. LEBOWITZ MD. Epidemiological studies of the respiratory effects of air pollution. *Eur Respir J* 1996;9:1029-54.
10. FAUROUX B, SAMPIL M, QUENEL P, LEMOULLEC Y. Ozone: a trigger for hospital pediatric asthma emergency room visits. *Pediatr Pulmonol* 2000;30:41-6.
11. GRANT EN, ALP H, WEISS KB. The challenge of inner-city asthma. *Curr Opin Pulm Med* 1999;5:27-34.
12. KAPLAN BA, MASCIE-TAYLOR CG. Biosocial correlates of asthma in national sample of young adults. *J Biosoc Sci* 1989;21:475-82.

13. DALES RF, CHOI B, CHEN Y, TANG M. Influence of family income on hospital visits for asthma among Canadian school children. *Thorax* 2002;57:513-7.
14. MAUNINO DM, HOMA DM, REDD SC. Involuntary smoking and asthma severity in children: data from the third national health and nutrition examination survey. *Chest* 2002;122:409-15.
15. RUTTEN-van MOLKEN MP, van DOORSLAER EK, van VLIET RC. Statistical analysis of cost outcomes in a randomized controlled clinical trial. *Health Econ* 1995;3:333-45.
16. ERICKSON SR, CHRISTIAN RD, KIRKING DM, HALMAN LJ. Relation between patient and disease characteristics, and health-related quality of life in adults with asthma. *Respir Med* 2002;96:450-60.
17. OSMAN LM, CALDER C, GODDEN DJ, FRIEND JA, MCKENZIE L, LEGGE JS, DOUGLAS JG. A randomized trial of self-management planning for adult patients admitted to hospital with acute asthma. *Thorax* 2002;57:869-74.
18. CHEN JT, KRIGER N, van den EADEN SK, QUENSBERRY CP. Different shapes for different folks: socioeconomic and racial/ethnic disparities in asthma and hay fever among 173,859 U.S. men and women. *Environ Health Perspect* 2002;110 (Suppl 2):211-6.
19. HIDE DW, MATTHEWS S, SREVEN S, RIDOUT S, TWISLTON R, GANT C, ARCHAD SH. Effect of allergen avoidance in infancy on allergic manifestations at age two years. *J Allergy Clin Immunol* 1994;93:842-6.
20. SACKETT D, HAYNES R. Compliance with therapeutic regimes. Baltimore: Johns Hopkins University Press, 1976.
21. STURDY PM, VICTOR CR, ANDERSON HR, BLAND JM, MUTLAND BK, HARRISON BD, PECHITT C, TAYLOR JC. Psychological, social and health behaviour risk factors for deaths certified as asthma: a national case-control study. *Thorax* 2002;57:409-15.
22. MANCUSO CA, PETERSON MG, CHARLSON ME. Effects of depressive symptoms on health-related quality of life in asthma patients (see comments). *J Gen Intern Med* 2000;15:301-10.
23. BENEDITO-MONLEON C, LOPEZ A, ALONSO J. Psychological factors in childhood asthma. *Behav Cogn Psychol* 1994;22:153-61.
24. WEIL CM, WADE SL, BAUMAN LJ, LYNN H, MICHELL H, LAVIGNE J. The relationship between psychosocial factors and asthma morbidity in inner-city children with asthma. *Pediatrics* 1999;104:1274-80.

#### Sažetak

#### NEKI ČIMBENICI RIZIKA UDRUŽENI S ASTMOM

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Cilj ovoga istraživanja bio je ispitati jesu li neki čimbenici rizika značajno više prisutni u promatranoj skupini astmatičara u usporedbi s kontrolnom skupinom ispitanika. Istraživanjem je obuhvaćeno 100 astmatičara i 100 ispitanika bez astme. Podaci su prikupljeni metodom razgovora i anketiranja. Rezultati su pokazali da astmatičari imaju nižu razinu obrazovanja, slabije surađuju u liječenju svoje bolesti, te da su češće na bolničkom liječenju zbog svoje bolesti. Među astmatičarima te u njihovim obiteljima je bilo značajno više atopičara negoli u kontrolnoj skupini. Međutim, astmatičari su imali značajno manje drugih kroničnih bolesti. Smatramo stoga kako liječenje astme treba biti strogo individualno za svakog bolesnika, temeljeno na kliničko-funkcijskim parametrima plućne funkcije i prema važećim svjetskim smjernicama za liječenje astme, kao i na psihosocijalnim značajkama svakog bolesnika. Zaključujemo kako liječenje astme uza suvremenu farmakološku terapiju treba uključivati i edukaciju bolesnika o njegovoj bolesti i metodama liječenja, razne psihoterapijske postupke, te postupke samopomoći.

*Ključne riječi: Astma – prevencija i suzbijanje; Astma – socioekonomski čimbenici; Respiracijska preosjetljivost – epidemiologija; Čimbenici rizika; Metode samopomoći; Metode edukacije bolesnika*