HOUSEHOLD ENVIRONMENTAL TOBACCO SMOKE AND RESPIRATORY DISEASES AMONG CHILDREN IN NIŠ (SERBIA)

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SUMMARY

The authors investigated the relationship between household environmental tobacco smoke (ETS) exposure and prevalence of respiratory symptoms and diseases as well as absenteeism related to respiratory illness in schoolchildren. The study sample consisted of 1,074 children aged 7–11 years from three primary schools in Niš (Serbia). ETS exposure was associated with wheezing (OR−1.48; 1.09–2.01), bronchitis (OR−1.66; 1.23–2.23), headache (OR−1.45; 1.08–1.95), and fatigue (OR−1.38; 1.02–1.85) in exposed children. The other risk factors with possible influences weren't assessed. There was no statistically significant difference in the number of physicians' visits as well as in absenteeism from school due to illness in children exposed to ETS in comparison to non exposed children. The tobacco smoke effect on children is an essential and urgent problem with life lasting negative health effects which are preventable.

Key words: environmental tobacco smoke, respiratory diseases

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INTRODUCTION

Household environmental tobacco smoke (ETS) is a major source of indoor air contaminants and it presents an important public health problem (1). Environmental tobacco smoke is a dynamic, complex mixture of more than 4,000 chemicals found in both vapour and particle phases. Many of these chemicals are known toxic or carcinogenic agents.

Many previous studies have shown that a large number of children are exposed to environmental tobacco smoke in their homes (2−4). The World Health Organization estimated that approximately half of the children in the world are exposed to ETS, mostly in their homes (5). In the United States, approximately 60% of children aged 3 to 11 years are exposed to secondhand smoke (6) and 25% live with one or more smokers in their home (7).

Children are particularly vulnerable to the harmful effects of environmental tobacco smoke because of their relatively underdeveloped immune and pulmonary systems, their small body size, and their higher rates of ventilation (8, 9).

Exposures to ETS have been associated with a variety of adverse health effects in children. Several recent studies link ETS with increased incidence and prevalence of asthma and increased severity of asthmatic symptoms in children of mothers who smoke heavily (10). These respiratory illnesses in childhood may very well contribute to the significant lung function reductions associated with exposure to ETS in adults. There is also strong evidence of increased middle ear effusion (11), reduced lung function, and reduced lung growth (12). Some U.S. studies have also shown a relationship between environmental tobacco smoke and cognitive abilities among children and adolescents (13).

The aim of this study was to estimate the effects of environmental tobacco smoke on prevalence of respiratory symptoms and diseases as well as absenteeism related to respiratory illness in schoolchildren.

MATERIALS AND METHODS

Three primary schools in Niš (Serbia) with a total of 1,309 children aged 7 to 11 years were chosen randomly. Assessment of exposure to ETS was done by using the original questionnaire. Trained physicians filled in questionnaires during interviews with children's parents. The study sample consisted of 1,074 children and the response rate was 82%.

Exposure of children to ETS was examined on the basic responses to following questions: "Does anyone smoke in the house?", and "How many smokers live at home?".

The second part of the questionnaire was about prevalence of respiratory symptoms (nasal congestion, nasal secretion, dyspnea, wheezing, cough), respiratory diseases (sinusitis, bronchitis, asthma, pneumonia), nonspecific symptoms (watery eyes, dry throat, headache, fatigue) and absenteeism related to respiratory illness in children in the past 12 months. Respiratory diseases were considered if an affirmative answer was given to the following questions: "Has any doctor diagnosed your child with asthma

(sinusitis, bronchitis, pneumonia)?" The other risk factors of the given symptoms and diseases were not followed.

Investigated children were divided into two groups: exposed and non exposed to ETS. In both groups, prevalence of symptoms and disease was scrutinized. Interview data were analysed using programmes Epi Info 6 and Microsoft Excel. Statistical significance of difference is established by Pearson's chi-squared test. The odds ratio and 95% confidence interval were calculated to evaluate the presence of associations between all symptoms and diseases in the children and ETS.

RESULTS

Studied sample included 554 (51.60%) boys and 520 (48.40%) girls. The average (mean) age was 9.067 (SD−1.297) for boys and 9.096 (SD−1.233) for girls (Table 1).

It was found out that 69.65 % of examinees were exposed to ETS. Most exposed children live in households with one smoker, a smaller number of children live with two smokers (Table 2).

It is reported in this investigation that parental smoking was significantly associated with wheezing (OR=1.48; 1.09−2.01), bronchitis (OR=1.66; 1.23−2.23), headache (OR=1.45; 1.08−1.95), and fatigue (OR=1.38; 1.02−1.85) in exposed children. Data are presented in Table 3.

There was no statistically significant difference in the number of physicians' visits, as well as in absenteeism from school due to illness in children exposed to passive smoking compared to non exposed children (Table 4, 5).

DISCUSSION

This research has established a high level of indoor exposure to ETS in children in their families. Of the total number of respondents nearly 70% of children were exposed to this source of air pollution. We also found association between ETS and respiratory diseases. It has been determined that incidence of bronchitis in children exposed to ETS was higher. Consequently, wheezing, headache, and fatigue were more frequent in the exposed children.

Other investigations, but not all, give similar results. Strachan and Carey at Sheffield found on a sample of children aged 11 to 16 years, that wheezing had been more frequent in children whose mothers smoked more than ten cigarettes a day and that the relative risk is 2.28 (14). The consequences of exposure to ETS were also studied in Boston on a sample of children aged 7 to 12 years (15). It was found that in exposed children relative risk of cough is higher (RR=12.4, CI= 2.4−63.3) and they have used bronchodilators more frequently (RR=10.3, CI=1.3−83.7). A group of scientists in Portugal have shown a positive relationship of ETS exposure with the occurrence of respiratory symptoms (cough and wheeze) but not with asthma (16).

Prevalence studies in school age children suggest respiratory infections, wheezing, and asthma are more frequent in children whose parents smoke (17, 18).

For example, Mc Kenzi and Bush have concluded that exposure to ETS can worsen symptoms in children with asthma (3).

A group of scientists in Brazil (2) examined the impact of exposure to tobacco smoke in preschool children. More than half of surveyed children were exposed to ETS, and 82% of children exposed to this risk factor had respiratory problems: cough (OR=1.58; CI=1.09−2.28), wheezing in the chest (OR=1.91; CI=1.36−2.67) and respiratory diseases (asthma, bronchitis and pneumonia) (OR=1.11; CI=1.11−2.31). Increased incidence of lower respiratory tract infections and asthma in children aged 4 to 9 years were found in another research in Brazil (19).

There is a limited evidence of ETS exposure and nonspecific symptoms among exposed schoolchildren.

This study found no statistically significant difference in the number of physicians' visits as well as in absenteeism from school due to illness in children exposed to ETS in comparison to not exposed children.

However, the results of other studies show that exposure to ETS is connected with high absenteeism from school due to problems with the respiratory system. A group of scientists in 12 cities in Southern California (20) examined the impact of ETS on asthma status of children and their absenteeism from the school due to respiratory disease. The investigation encompassed nearly 2,000 children. It has shown a significant effect of ETS exposure on absenteeism from the school due to respiratory disease (RR=1.27; CI=1.04−1.56). Compared with children who do not suffer from asthma and who are not exposed to ETS, children with asthma who live even with only one smoker are more likely to miss school (RR=2.35), and children living with two smokers miss school even more (RR=4.45).

School absenteeism due to respiratory diseases in children exposed to ETS was confirmed by other authors as well (21, 22).

Our study has some limitations. A retrospective questioning of children's parents about children morbidity in the past 12 month might have confounding effect despite being done by medical staff. Also, the sum of physician visits without distinguishing among reasons (diagnoses) and dates (seasons) is certainly not a sensitive way how to compare the health of exposed and non-exposed children. Chronic illnesses (e.g., allergies) were not taken into consideration as well as household conditions, socioeconomic status of families, education of parents, gender of children, exposure to airpollution etc. We were unable to investigate any dose-response relatioships because we lacked infomation on the intensity or duration of exposure. Moreover, it is possible that at this age some children from nonsmoking families were exposed to ETS outside their homes.

Table 1. *Characteristics of the population study*

Sex	Number (%)	Mean age
Male	554 (51.60)	9.067±1.297
Female	520 (48.40)	9.096±1.233

Table 2. *Number of smokers in household*

Number of smokers in household					Total
1	2	3	4	without smokers	
388 (36.13%)	326 (30.35%)	28 (2.61%)	7 (0.65%)	325 (30.26%)	1074

Table 3. *ETS exposure and observed symptoms*

Symptoms and diseases**	Number (%)				χ^2	OR	CI
	Exposed		Non exposed				
	Yes	No	Yes	No			
Nasal congestion	589 (78.6)	160 (21.4)	238 (73.2)	87 (26.7)	3.74	1.35	0.98–1.84
Nasal secretion	390 (52.1)	359 (47.9)	168 (51.7)	157 (48.3)	0.01	1.02	0.78–1.33
Difficulty breathing	101 (13.5)	648 (86.5)	43 (13.2)	282 (86.8)	0.01	1.02	0.69–1.53
Wheezing	241 (32.2)	508 (67.8)	79 (24.3)	246 (75.7)	6.71*	1.48	1.09–2.01
Cough	147 (19.6)	602 (80.4)	59 (18.2)	266 (81.8)	0.32	1.1	0.78–1.56
Sinusitis	19 (2.5)	730 (97.5)	9 (2.8)	316 (97.2)	0.05	0.91	0.39–2.21
Bronchitis	277 (37.0)	472 (63.0)	85 (26.2)	240 (73.8)	11.89*	1.66	1.23–2.23
Asthma	23 (3.1)	726 (96.9)	8 (2.5)	317 (97.5)	0.3	1.26	0.53–3.08
Pneumonia	100 (13.4)	649 (86.6)	37 (11.4)	288 (88.6)	0.79	1.2	0.79–1.83
Watery eyes	119 (15.9)	630 (84.1)	38 (11.7)	287 (88.3)	3.2	1.43	0.95–2.15
Dry throat	150 (20.0)	599 (80.0)	57 (17.5)	268 (82.5)	0.9	1.18	0.83–1.67
Headache	262 (35.0)	487 (65.0)	88 (27.1)	237 (72.9)	6.44*	1.45	1.08–1.95
Fatigue	261(34.8)	488(65.2)	91(28.0)	234(72.0)	4.82*	1.38	1.02–1.85

* $p<0.05$
** only once

Table 4. *Exposure to passive smoking and the number of physicians' visits due to problems with respiratory system for the past year*

Passive smoking	Number of physicians' visits				Total	χ^2
	Not one	1–3	4–6	>6		
Yes	238 (22.16%)	416 (38.73%)	75 (6.98%)	20 (1.86%)	749 (69.74%)	χ^2=2.85 p>0.05
No	117 (10.89%)	176 (16.39%)	25 (2.33%)	7 (0.65%)	325 (30.26%)	
Total	355 (33.05%)	592 (55.12%)	100 (9.31%)	27 (2.51%)	1074 (100%)	

Table 5. *Exposure to tobacco smoke and absenteeism from school due to illness for the past year*

Passive smoking	Absenteeism from school				Total	χ^2
	Not one	1–3	4–6	>6		
Yes	240 (22.35%)	423 (39.39%)	66 (6.15%)	20 (1.86%)	749 (69.74%)	χ^2=7.18 p>0.05
No	122 (11.36%)	181 (16.85%)	16 (1.49%)	6 (0.56%)	325 (30.26%)	
Total	362 (33.71%)	604 (56.24%)	82 (7.64%)	26 (2.42%)	1074 (100%)	

CONCLUSIONS

However, our findings have practical and public health significance. This study confirmed that environmental tobacco smoke endangers children's health. The only way to fully protect children from tobacco smoke is to completely stop the habit of cigarette smoking in households and increase parents' knowledge about smoking health hazards. Even though there are laws in Serbia (23) that protect non-smokers from ETS exposure in public and work places there are no measures in force to protect children in their home indicating that involuntary secondhand smoke exposure and significant morbidity will persist. Because of that Public Health authorities should develop strategies to reduce tobacco smoke in the home environment. ETS awareness and control strategies for

households should also be incorporated into mandatory tobacco education programmes in schools.

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