

EFFECT OF PARENTAL SMOKING ON WHEEZY BRONCHITIS AND BRONCHIAL HYPERREACTIVITY

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In the course of the follow-up of 206 previously obstructive bronchitis children, the effect of parental smoking upon the occurrence of respiratory diseases, the yearly frequency of wheezing episodes and the age until the obstructive episodes used to return have been investigated. Familial and maternal smoking was more frequent in this group compared to the control group. In spite of this, however, no correlation could be detected between familial smoking and frequency of respiratory diseases, as well as the above mentioned characteristics of obstructive bronchitis. The familial smoking did not seem to influence the bronchial hyperreactivity challenged with acetylcholine, although the prevalence was higher.

INTRODUCTION

In the literature the influence of smoking on the development of chronic respiratory diseases in adults is widely discussed. Special attention is paid to the carcinogenic effect, as well as to changes in lung function parameters. By the progress of time the lung function parameters of smokers deteriorate faster than those of adults with chronic respiratory disease /3/. In young adult smokers there is no considerable alteration in lung function parameters yet, a change used to appear rather later at an age above 40 years /3/. Although the respiratory symptoms and coughing can be manifest much earlier /2, 5/.

In childhood the effect of passive smoking can primarily be considered, however, according to Wuthe and coworkers 62 % of children report on their smoking already at age of 16 years, boys try the first cigarette at 9, while girls in 13 years

/13/. Considerable proportion (6-30 %) of teenage boys smoke regularly daily more than one cigarette /1, 2, 4/. The stimulation for smoking comes partly from the parents, partly from the surroundings of the young people (clubs, gangs, etc.)

High number of children of smoking parent(s) exhibit chronic coughing as a significantly more frequent symptom compared to those of non-smokers /4, 6, 9/. Respiratory diseases (bronchitis, tracheitis) occur also considerably more frequently in children of smoking parents and especially if more than one of the family members do smoke /4, 6, 7/. According to Pedreira and coworkers the incidence of these respiratory diseases is higher under age of one year /12/. It has to be noted that children living with family-members suffering from chronic respiratory disease and excreting sputum were found to have respiratory diseases in higher proportion than those under healthy conditions /6, 12/. The investigations of Lebowitz and Burrows carried on at Tucson with several thousands of children showed similar correlation between familial smoking and respiratory symptoms, however, independently of the smoking habits, these symptoms showed significant correlation with familial respiratory diseases, as well /9/.

Maternal smoking was observed to cause more frequent respiratory symptoms in children /4, 12, 13, 14, 15/. This correlation was, however, not experienced by Liard and coworkers /10/. Maternal smoking yielded significantly frequent wheezing in children as reported by several authors /7, 11, 13/. Weiss and coworkers registered wheezing more often even in the case of familial smoking /16/. In contrast, the prospective study of Horwood and coworkers does not show any correlation between familial smoking and wheezing until 6 years of age /8/. The postnatal mortality, as well as the number of respiratory diseases manifested until 5 years of age were found to be higher in children whose mothers did smoke during pregnancy /14/.*

The impact of familial smoking upon the lung function values of children and upon bronchial hyperreactivity was also studied. In a prospective study of Tager and coworkers the FEV₁

values of children aged 5-9 years of smoking parents and especially of smoking mothers, did not show normal progress /15/. In their view, the development of alveoli in the infantile lung at this age - alveolization period - is impaired by the smoke. In contrast, Wuthe and coworkers in their cross-sectional examinations found no difference in lung function parameters (FEV_1 , FVC, PEF, R_t) even in the case of smoking children /18/. Woolcock and coworkers following infantile and childhood respiratory diseases observed lower flow-volumes with familial smoking /17/. 10 years after RSV (respiratory syncytial virus) infection Pullen and Hey showed lower lung function values and increased bronchial reactivity relative to the average, however, these differences seemed to have no correlation with familial smoking /13/.

Our study performed 10 years after obstructive bronchitis of children under the age of 2 years investigates the influence of maternal and familial smoking on the trends of the disease and on bronchial hyperreactivity, as well.

PATIENTS AND METHODS

The follow-up examination involved children treated with obstructive bronchitis at the I. Department of Paediatrics 10 years earlier. Criteria of obstructive bronchitis were as follows: wheezing accompanied by symptoms of airway infection, prolonged expiration and hyperinflated lungs to be detected also with X-ray, as well as by physical examination at age under 2 years.

206 children aged between 9-13 years (mean 11 years), boy: girl ratio 2:1, were enrolled in the study. The child's own and familial history including maternal and/or familial smoking, date of the first obstructive episode, yearly frequency of episodes, the age until these episodes occurred, frequency of other respiratory diseases were registered on questionnaires. The incidence of pneumonia, bronchitis, otitis, tonsillitis, laryngitis and angina was scored with marks 0 - 3 resulting in Σ value. The term "frequent respiratory disease" was applied if the Σ value was over 8 and exceeding the mean + 2SD of that of control group.

Bronchial hyperreactivity was examined by acetylcholine challenge. Acetylcholine solution of 0.5 % concentration nebulized by ultrasonic nebulizer (TUR-USI 50) was inhaled by children for 3 minutes, and PEF (peak flow) and FEV_1 (forced expiratory volumen in the first sec) were measured in the 3.,

5. and 10. minutes thereafter. In the case of negative results, the challenge was repeated with a solution of 1 % concentration again for 3 minutes. Positive response, i.e. bronchial hyperreactivity was considered when the PEF and/or FEV₁ values decreased by more than 20 % compared to the initial ones. At the time of the examination the children were symptomfree and so were they in the 4 weeks prior to the examination, as well.

Data of 82 healthy children of similar age and sex distribution were registered on questionnaires serving as controls.

The examination data were processed by a computer. In the mathematical statistical calculations the level of significance was $p < 0.05$.

RESULTS

In 73 % of the study group familial, while in 43 % maternal smoking was registered (Fig. 1). The control group contained

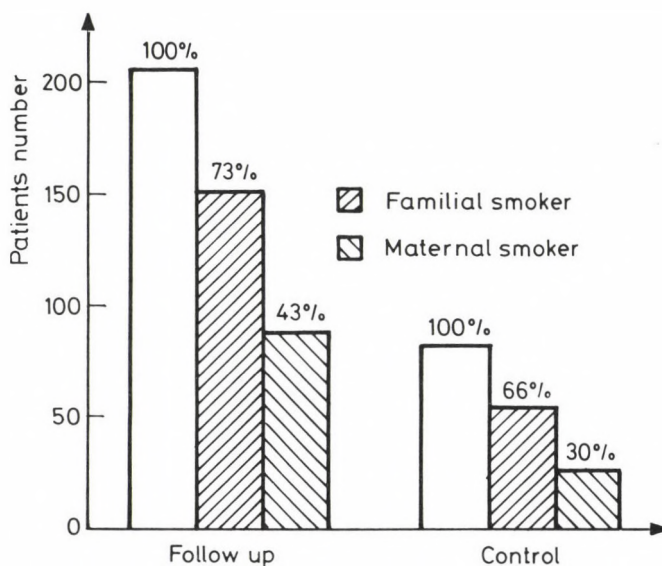


Fig. 1. Familial and maternal smoking

children living with familial smokers in 6 %, and with smoking mothers in 30 %. The frequency of familial smoking was high,

although not significant, in both groups, while maternal smoking differed greatly in the two groups, but this was not significant either ($p < 0.10$).

80 % of the children had their first wheezy episode before the age of one year. Appearance of the first episodes divided to age: 0-6 months, 7-12 months and later than 12 months, no correlation could be found between the familial and/or maternal smoking and point of time of the first episode ($p=0.20$ and $p=0.63$ resp.) (Table I).

TABLE I

The first episode set up

	0-6	7-12	over 12		0-6	7-12	over 12
		months				months	
no smoker	23	18	15		23	18	15
familial							
smoker	82	40	28	mother	43	26	19
	$p = 0.20$				$p = 0.63$		

40 % of the children had only one obstructive episode, but 60 % of them had several ones. Similarly no significant correlation was found between the familial and/or maternal smoking and the frequency of episodes $p=0.28$ and $p=0.23$, resp. (Table II).

Obstructive episodes occur after 3 years of age in 29 % of the children, while after 7 years of age only in 8 %. Smoking family members or mothers were present in both age groups in similar ratio: 75-75 % (Table III) and no significant correlation could be established between the time of setting in of obstructive episodes and familial smoking ($p=0.65$) and maternal smoking, resp. ($p=0.35$).

The yearly number of obstructive bronchitis episodes is a good marker for the severity of the disease. 20 % of the

TABLE II
Frequency of wheezy episodes

	only once	2-3x	4 or more		only once	2-3x	4 or more
no smoker	20		13		20		13
familial			23				23
smoker	62		21	mother	34		11
			67				43
	p = 0.28				p = 0.23		

TABLE III
The wheezy episodes disappeared

	till 3 years	over 3 years		till 3 years	over 3 years
no smoker	41	15		41	15
familial					
smoker	105 (75 %)	45 (75 %)	mother	58	30
	p = 0.65			p = 0.35	

children had yearly 3 or more times episodes. No significant correlation was found between the familial and/or maternal smoking and severity and yearly frequency of the obstructive episodes, $p=0.95$ and $p=0.45$, resp. (Table IV).

TABLE IV
The episodes per year

	1-3 times	over 3		1-3 times	over 3
no smoker	45	11		45	11
familial					
smoker	120	30	mother	66	22
	$p = 0.95$			$p = 0.45$	

Children having undergone obstructive bronchitis suffer more frequently from respiratory diseases compared to the controls, mean 6.63 vs. 3.71 (Table V). Respiratory diseases occur

TABLE V
The frequency of respiratory tract infections

		Patients	Controls
Respiratory tract infections			
	mean	6.63	3.71
	SD	2.31	1.97
Frequency			
	Σ 0 - 8	158	81
	Σ over 8	48 (23%)	1 (1%)
		$p < 0.001$	

significantly more frequently - Σ value over 8 - among the follow-up children than in controls ($p < 0.001$). The familial

and/or maternal smoking shows no correlation with the frequent respiratory diseases, $p=0.27$ and $p=0.42$ resp. (Table VI).

TABLE VI

Respiratory tract infections

	till ≤ 3	over ≥ 3		till ≤ 3	over ≥ 3
no smoker	40	16		40	16
familial					
smoker	118	32	mother	68	20
	$p = 0.27$			$p = 0.42$	

Bronchial challenge with acetylcholine solution of 0.5 % concentration resulted in PEF and/or FEV_1 decrease corresponding to bronchial hyperreactivity in 31 children (15 %), while none of the control children. No significant correlation could be established between bronchial hyperreactivity and familial smoking ($p=0.29$).

DISCUSSION

In the course of the follow-up of 206 children having been treated for obstructive bronchitis under 2 years of age, familial smoking was found in high proportion: 73 %. Within this, the maternal smoking reaches also high ratio: 43 % compared to the control group. Pedreira and coworkers examined 1143 children in the neighbourhood of Washington and found only 36 % smoking frequency in the families /12/.

Our follow-up examinations showed that respiratory diseases occurred more frequently in the obstructive bronchitis group compared to the control group. At the same time, however, we were unable to observe significant correlation between the frequency of respiratory diseases and familial or maternal smoking, in contrast to several other investigators /4, 6, 7,

9, 12/. Our results agree with those of Liard and coworkers /10/.

Weiss and coworkers described the wheezing "inducing" effect of familial smoking, while maternal smoking yielded wheezing more frequently as reported by several authors /7, 10, 11, 13/. On the other hand, orwood and coworkers in their prospective study, did not find similar correlation. In our follow-up examinations the familial and/or maternal smoking did not influence the yearly frequency of wheezy episodes, their first appearance and the age until they are repeated.

The ratio of bronchial hyperreactivity was higher among children having undergone obstructive bronchitis compared to the healthy controls. Similarly to the data of Pullen and Hey /13/ no correlation could be detected between familial smoking and bronchial hyperreactivity.

Although our examination results do not seem to support the findings of several authors cited above, i.e. the deteriorating effect of passive smoking, the hazard of the high familial smoking should be emphasized.

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