

Effects of environmental tobacco smoke on the health of children in the Syrian Arab Republic

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تأثير دخان التبغ البيئي على صحة الأطفال في الجمهورية العربية السورية وسيم مزيك وفواز مزيك ومأمون المشرف

خلاصة: لا توجد في الجمهورية العربية السورية دراسات حول تأثيرات دخان التبغ البيئي في الأطفال. لذلك أجرينا دراسة مقطعية على تأثير دخان التبغ في البيئة المنزلية على 1859 طفلاً دون الثانية عشرة من العمر من مناطق حضرية وريفية على السواء. وثبت أن تدخين الوالدين في البيوت كان مصحوباً بأمراض تنفسية لدى الأطفال. كما أن تدخين الوالدين كان يزيد من احتمالات وقوع متلازمة الموت الفجائي للمواليد، وكان يصاحبه كذلك وجود مدخنين آخرين من سكان البيت الأمر الذي يزيد من تعرض الأطفال. وعلى حد علمنا، كانت هذه أول دراسة في الجمهورية العربية السورية تسجل الارتباط الواضح بين دخان التبغ البيئي وبين أمراض الطفولة التنفسية.

ABSTRACT In the Syrian Arab Republic, studies on the effects of environmental tobacco smoke on children are lacking. We conducted a cross-sectional study on the effect of household environmental tobacco smoke on 1859 children under 12 years from both urban and rural areas. Parental and household smoking were associated with respiratory morbidity in the children. Parental smoking was associated with an increased likelihood of having sudden infant death syndrome in the family and was also associated with the presence of other smokers within households, which adds to children's exposure. To our knowledge this is the first study in the Syrian Arab Republic to report a clear association between environmental tobacco smoke and childhood respiratory morbidity.

Effets de la fumée ambiante du tabac sur la santé des enfants en République arabe syrienne

RESUME En République arabe syrienne, les études sur les effets de la fumée de tabac dans l'environnement sur les enfants font défaut. Nous avons réalisé une étude transversale sur l'effet de la fumée de tabac dans l'environnement familial auprès de 1859 enfants âgés de moins de 12 ans des zones urbaines et rurales. Le tabagisme des parents et au foyer était associé aux maladies respiratoires chez les enfants. Le tabagisme des parents était associé à une plus forte probabilité de survenue du syndrome de la mort subite chez le nourrisson dans la famille et était également associé à la présence d'autres fumeurs au foyer, ce qui accroît l'exposition des enfants à la fumée. A notre connaissance, c'est la première étude en République arabe syrienne à faire état d'une association claire entre la fumée ambiante du tabac et les maladies respiratoires chez l'enfant.

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Introduction

The link between exposure to environmental tobacco smoke (ETS) and children's morbidity and mortality is well established [1]. Parental smoking has been associated with an increase in lower respiratory illnesses and chronic respiratory symptoms during the first 5 years of life [2]. Also, children of parents who smoke have a two-fold-increased risk of dying of sudden infant death syndrome (SIDS), the most common cause of death in the first year of life in industrialized countries [3]. Pregnant smokers have an increased risk of abruptio placenta, placenta praevia, bleeding during pregnancy, premature and prolonged rupture of placental membranes and preterm delivery [4].

In the Syrian Arab Republic, local anti-smoking efforts are hindered by the lack of any standardized research investigating the effect of ETS on children. Little, if any, data on the problem of smoking in this country are available for health promoters and policy-makers [5].

The long-term effects of active or passive smoking are often not a deterrent to smoking parents, since they represent remote possibilities. However, short-term effects of parental smoking on their babies and children can be a source of concern to most parents. This study was conducted to investigate some of the short-term effects of ETS on children under 12 years of age, especially those effects related to the respiratory tract, prematurity, weight and SIDS. We also evaluated some of the factors which could possibly increase the likelihood of respiratory illness in the studied population, for example sibship size, household size and birth order. Data suggest that exposure to respiratory infection increases with sibship and birth order [6]. This is the first study to explore ETS-relat-

ed morbidity and mortality in children in the north of the Syrian Arab Republic.

Methods

We performed a cross-sectional study looking at the effects of parental and household smoking on infants and children under 12 years of age in the city of Aleppo and the surrounding countryside. Every child with a health complaint that visited the participating clinics during the study period was included. Of the 12 clinics which responded, 8 were chosen according to their location in order to obtain data from different areas of the city.

Data were collected from all patients who visited any of these clinics during 10 consecutive days per month for six months, starting in February 1998. It was left to the paediatrician to decide which third of the month to report, but once chosen it was fixed for that particular clinic (e.g. the first third of each of the 6 months). The reason for this design was to guard against under/overreporting should the participating paediatrician feel unwilling to reveal his or her actual monthly workload. Also, this system prolonged the data collection period, hence diluting the effect of short bursts of respiratory illnesses that are common in practice in Aleppo.

We primarily considered the effects of household ETS on the respiratory tract of children under 12 years of age. Further aspects which were examined included:

- the relationship between household ETS and a child's weight and prematurity;
- the relationship between household ETS and the history of SIDS in the family;
- other factors that can influence the study outcomes, such as birth order, sibship size, household size, rural or ur-

ban residence and economic status of the family.

A standard questionnaire containing 16 questions related to smoking, socioeconomic status of the child's family, the child's current illness and a record of the past year's respiratory illnesses was given to participating physicians. Prematurity was assessed by asking the parents if the child was born preterm (less than 37 weeks) and SIDS was assessed by asking the parents if they had lost any child during his or her sleep in the first year of life without any apparent cause. Respiratory tract illness was defined as any respiratory tract symptoms that were not apparent at birth and necessitated a physician's consultation. Since we based our assessment on subjective information collected from the children's parents, we believed that this definition of respiratory tract illness would be most practical for the study purposes. For children whose presenting symptoms were related to the respiratory tract, additional information about the presence of chronic respiratory symptoms, such as cough, nasal discharge, wheezing, dyspnoea, and mouth breathing and snoring, was also gathered.

We assessed the economic status of the family indirectly using the density index (DI), which we calculated by categorizing

the household on the number of rooms occupied by it (excluding the kitchen and bathrooms).

A smoker was defined as some one who had smoked regularly on some or all days in the previous month. This definition conforms with the recent World Health Organization publication *Guidelines for controlling and monitoring the tobacco epidemic* [7].

Statistical analysis

Data are presented as mean \pm the standard error of the mean. The chi-squared test with continuity correction was used to test associations between categorical variables. The Mann-Whitney U test was used for statistical analyses of comparisons between groups. Correlation coefficients were obtained using Spearman's rank method. $P < 0.05$ was considered significant and a two-tailed test was used in all analyses. Analysis was carried out on the whole sample and after stratification according to place of residence.

Results

We collected data on 1859 sick children and their families. The main characteristics of the children studied are shown in Table 1. Non-respondents were less than 2%

Table 1 Main characteristics of the studied sample in relation to the presenting complaint

Complaint	Age mean \pm s \bar{x}	Sex*		Residence*		Sibship mean \pm s \bar{x}	Household size mean \pm s \bar{x}	Density index mean \pm s \bar{x}
		Male	Female	City	Country			
Respiratory	1.6 \pm 0.1	480	289	520	261	3.6 \pm 0.1	7.2 \pm 0.2	2.4 \pm 0.1
Other	1.8 \pm 0.1	638	424	534	543	3.9 \pm 0.1	7.4 \pm 0.1	2.6 \pm 0.1
Total	1.7 \pm 0.1	1118	713	1054	804	3.7 \pm 0.1	7.3 \pm 0.1	2.5 \pm 0.01

* Numbers do not add up to the total number of children investigated (1859) because of missing responses.
s \bar{x} = standard error of the mean

of those interviewed. Male children were more likely to be brought to the clinics than females ($P < 0.001$). This held true after stratification according to place of residence; males comprised 59.2% and 62.7% of the patients for the city and countryside, respectively ($P < 0.001$ for both). The prevalence of smoking among adult males (fathers) in this sample was 57.8% and among adult females (mothers) was 7.5%. Smoker mothers alone comprised 1.4% of the sample, while both parents being smokers accounted for 6.1%.

The effects of parental smoking on the major study outcomes are summarized in Table 2. Parental smoking patterns did not differ significantly between urban and rural residents ($P = 0.2$). Also, the mean number of smokers within a household did not differ according to the place of residence (0.9 ± 0.31 and 0.9 ± 0.34 for city and country,

respectively) ($P = 0.86$). Parental smoking was associated with the presence of other smokers in the household ($P < 0.001$).

The total number of smokers within the household was associated with the child presenting with a respiratory complaint ($P = 0.02$) and with the presence of chronic respiratory symptoms ($P = 0.01$). Household size correlated with the number of smokers within the house ($P < 0.001$). The number of smokers within the household positively correlated with the number of respiratory illnesses the child had in the past year ($P < 0.001$) but it did not correlate with the number of hospitalizations from a respiratory tract illness in the past year ($P = 0.5$). The number of smokers within the household inversely correlated with children's weight for urban residents only ($P = 0.03$).

Table 2 Differences between children of smoking and non-smoking parents in relation to main study outcomes

Outcome	Parental smoking		P-value	OR	95% CI
	Yes	No			
Presenting complaint					
Respiratory	486	297	0.03	1.24	1.03-1.5
Other	614	467			
Respiratory symptoms					
Chronic	129	53	0.007	1.7	1.2-2.4
Acute	349	239			
Prematurity					
Yes	50	24	0.15	1.48	0.9-2.4
No	1048	742			
SIDS					
Yes	33	9	0.014	2.6	1.2-5.9
No	1039	735			
Respiratory illnesses					
mean \pm s_x	1.6 ± 0.7	1.3 ± 0.6	0.02		
Hospitalizations					
mean \pm s_x	0.4 ± 0.9	0.2 ± 0.6	0.5		

OR = odds ratio

SIDS = sudden infant death syndrome

CI = confidence intervals

s_x = standard error of the mean

DI was positively correlated with the number of smokers within the household ($P < 0.001$), i.e. the higher the density, the more smokers in the household. Also, the DI correlated inversely with children's weight ($P < 0.001$) but after stratification according to residence, this negative correlation was not significant for rural residents ($P = 0.4$). A higher DI was found in the countryside compared with urban households ($P < 0.001$). The mean number of people in the household was higher in the countryside (8.5 ± 0.2) than in the city (6.4 ± 0.1) ($P < 0.001$). Also, the mean number of siblings was higher in the countryside (4.3 ± 0.1) than in the city (3.2 ± 0.7) ($P < 0.001$). Birth order and sibship size did not correlate with the number of respiratory tract illnesses in the past year ($P = 0.1$ and $P = 0.8$ respectively); neither did the total household size ($P = 0.1$).

No association was found between parental smoking status and a child's prematurity. However, SIDS was significantly associated with parental smoking ($P = 0.02$) (Table 2).

Discussion

Although the use of objective measurements of children's ETS exposure, such as the saliva cotinine level, is more accurate than parental recall [8,9], the cost of such measurements would have hindered the study of a large number of children in order to find associations between ETS and rare outcomes such as SIDS and prematurity. Also, the effect of maternal smoking, which is important for certain health outcomes in children, requires studying a large number of families because female smoking is not common in our region [5].

We are well aware of the possible sources of bias in our study, mainly the re-

call bias and interviewer bias. But the inclusion of many paediatricians, the use of a simple, standardized questionnaire and the large sample size should minimize these biases. Also, because we felt that parents, mothers in particular, may be reluctant to report their smoking behaviour to their paediatrician, we asked the nurse or secretary in the waiting room to collect data related to parental and household smoking.

Another factor to be considered was that children's own smoking could affect our results. However, since children under 5 years of age constituted over 90% of our sample, this confounder was considered to be negligible, although not completely ruled out. Also, the age of our sample minimizes the possible effect of outdoor exposure to ETS as a source of childhood morbidity.

Our results show that parental smoking is a major hazard to the health of children under 12 years of age. It is associated with the development of respiratory illnesses, with the development of chronic respiratory symptoms and with having more respiratory illnesses in the preceding year (Table 2). These findings support previous observations made in industrialized countries [10]. Our study shows that household smoking also contributes to the respiratory morbidity of children. The seriousness of this fact becomes apparent when we realize that 63.3% of the families studied had one smoker or more living in the house. Additionally, we demonstrated that when parents were smokers, other smokers were more likely to be found in the household ($P < 0.001$). Therefore, smoking parents are harming their children directly and also by encouraging others within the house to smoke. Furthermore, according to a recent study conducted by us on tobacco use among adolescents (investigating more than 16 000 high-school students), young people of smoking parents were 4.4 times

more likely to be smokers themselves than those of non-smoking parents (W. Maziak et al. unpublished data, 1998). It is vital to repeat this message again and again to parents in any anti-smoking efforts in this country.

SIDS was also associated with parental smoking. Children of smoking parents were 2.6 times more likely to die from SIDS than children of non-smoking parents. Other studies have reported similar findings but a lower risk [11].

Studies from industrialized countries show that lower respiratory tract infection correlated more with maternal smoking in the early part of a child's life [12]. It is thought that this effect is due to the fact that mothers spend more time with their infants in the first 2 years than their fathers. This is true for our region too, but the small number of families in our sample with only a smoking mother did not allow us to reach a conclusive result about the effect of sole maternal smoking.

Our study found some differences between urban and rural residence in relation to ETS-induced respiratory morbidity. Despite the fact that the number in the household, number of siblings and the DI were all higher in the countryside, respiratory-related symptoms were significantly higher among urban children both in frequency ($P < 0.001$) and duration ($P = 0.02$). It is known, however, that air pollution is lower in the countryside, probably because of substantially lower car and industrial emissions. Also, rural houses are usually more spacious and better ventilated than urban ones. These factors could reduce the effect of home ETS on the respiratory system of children.

We found that the higher the DI, the more likely it was that parents or other members within the household smoked, which is disturbing. It means that families

with scarce resources add the harmful effects of cigarette smoke on their children's health to the already known adverse affects of poverty [13].

There was an inverse correlation between the number of smokers within a household and children's weight in urban residents but not rural ones. We also found that the mean weight of the children studied was lower in the countryside (9.6 ± 0.2 kg) than in the city (10.8 ± 0.2 kg) ($P < 0.001$). It is possible that other factors may be affecting children's weight in the countryside, thus masking the effect of ETS on this variable.

Male children were more frequently brought to doctors than female children (59.7% males and 38.6% females, $P < 0.001$). This could be explained by the prevailing traditions in our society whereby male children are favoured.

It was interesting that birth order and sibship size did not play a role in determining respiratory morbidity. However, overcrowded households constituted the majority of our sample, which could mask the effects of sibship size and birth order on the respiratory tract of children in our study.

The number of smokers within a household strongly correlated with the number of respiratory tract illnesses in the past year ($P < 0.001$). It did not, however, correlate with the severity of respiratory tract illnesses as judged by the number of hospital admissions caused by those illnesses. Chen et al. and El-Sawy et al. reported an increase in the severity of respiratory illness related to ETS exposure in early childhood [14,15]. However, we used a subjective assessment of the level of exposure to ETS depending on the number of smokers within the household, which is less sensitive than the direct measurement of nicotine metabolites used in both of those studies.

Although the parents did not form a representative sample of the adult population in this region, their smoking rates can provide a rough estimate of the prevalence of smoking among married adults. Our results showed that 57.5% of males and 7.8% of females in the population were regular smokers. These rates are higher than those reported for adults in the Eastern Mediterranean Region for both sexes (35% for males and 4% for females) [5], and those reported earlier by us for middle class, educated males in Aleppo (33.5%) [16]. This difference can be explained by the fact that sick children seen in paediatric clinics are more likely to come from families with one or more smokers in them and by the possibility that a sample containing only married couples with children is likely to be older than a sample of the adult population in general. However, these figures are disturbing since parents coming to the doctor with their sick child may underreport their smoking habit.

Conclusion

To the best of our knowledge this is the first report on the effects of home ETS on the respiratory health of children under 12 years of age in the Syrian Arab Republic. It shows the deleterious effects of parental and household smoking on the health of their children. Also, parental smoking encourages other members of the household to smoke, which adds to ETS-related children's morbidity. Poorer families tend to have more smokers among the household adding to the unfavourable conditions of their children.

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