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Respiratory effects in children from passive smoking of cigarettes and *narghile*: ISAAC Phase Three in Syria

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SUMMARY

BACKGROUND: The association between environmental tobacco smoke (ETS) and asthma symptoms is well documented, but a causal relationship is inconclusive. International Study of Asthma and Allergies in Childhood (ISAAC) Phase Three was the first to report a dose-response relationship between current wheezing and exposure to parental cigarette smoke. As exposure of children to water pipe (*narghile*) smoke is of concern in Syria, in the ISAAC Phase Three Tartous Centre we also examined the role of parental smoking of the narghile.

METHODS: Parents of children aged 6–7 years completed core written questionnaires about the prevalence of symptoms, and an environmental questionnaire for other risk factors, including parental cigarette smoking. We added questions about narghile to the questionnaire.

RESULTS: Among 2 734 pupils (49% females) surveyed, we found an association between exposure to ETS of the mother smoking cigarette or narghile and ever wheezing, nocturnal cough and severe wheeze; however, the strongest association was found when the mother smoked narghile. Mother smoking narghile was also associated with exercise wheeze. Father smoking narghile, but not cigarettes, was associated with nocturnal cough, severe wheeze and exercise wheeze. The association with current wheeze became significant when mother smoked both cigarettes and narghile; however, the effect was additive and not synergic.

CONCLUSION: We recommend that international studies investigating ETS include questions on narghile smoking.

KEY WORDS: passive smoking; wheezing; water pipe; ISAAC; *narghile*

The International Study of Asthma and Allergies in Childhood (ISAAC) is a valid and unique collaborative project involving 156 centres from 63 developing countries from a total of 98 participating countries (237 centres), which developed a standardised methodology to describe the prevalence and severity of symptoms of asthma, rhinoconjunctivitis and eczema in children worldwide.[1,2]

In addition to using the same core questionnaire about the prevalence and severity of symptoms as Phase One, ISAAC Phase Three added an Environmental Questionnaire (EQ) on putative risk factors to open the way for future aetiological research and ultimate prevention. The EQ included questions on exposure to environmental tobacco smoke (ETS) of cigarettes.[2] The 2006 US General Surgeon's Report concluded that the evidence to infer a causal relationship between ETS from parental smoking and the onset of wheeze illnesses in early childhood is sufficient, and that the evidence to infer a causal relationship between ETS and the onset of childhood asthma is suggestive but not sufficient.[3]

The latest general reviews and meta-analyses[4–7] have reported associations between in-utero and parental exposure to ETS, asthma onset and asthma severity, but cannot infer an independent causal relationship for methodological bias or under-reporting of confounders, such as controlling for family history of atopy.[4] ISAAC Phase Three suggested a causal association between parental exposure to ETS and current childhood asthma.[2]

For the 6–7 year age group in ISAAC Phase Three, 165 centres from 65 countries submitted data to the ISAAC International Data Centre (IIDC).[2,8] Several centres reported a significant association of exposure to ETS, with current asthma symptoms defined as wheezing in the past 12 months, and with rhinoconjunctivitis.[5,9] Other ISAAC centres reported an association with nocturnal cough, but not current or ever wheezing or rhinoconjunctivitis.[10]

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Genome-wide association surveys have previously tracked susceptible genes for asthma,[5,11–13] which may be reprogrammed by exposure to ETS; this may be explained by an epigenetic mechanism.[5,11] In some Middle Eastern countries such as Syria, children are currently exposed to ETS from both cigarettes and water pipe (locally called *narghile*). All the above surveys and studies dealt with cigarette ETS; however, exposure to narghile smoke was not considered.[14,15] In the city of Tartous, in the coastal region of Syria, one of the centres that undertook ISAAC Phase Three research, we added to the ISAAC EQ questions about exposure to narghile smoke.

In this paper, we studied the impact of ETS of either cigarette or narghile on wheezing, cough and rhinoconjunctivitis in pupils aged 6–7 years living in Tartous.

METHODS

Population and sampling

In ISAAC Phase Three, samples of 3 000 children (minimum of 1 000) from each centre were selected by randomly sampling schools within a described geographical study area. The ISAAC study was carried out in Syria from March 2001 to November 2002 for the 6–7-year age group in 24 schools in the city of Tartous. Schools were randomly selected to ensure that the sample was representative of the wider community. All students in the class and age range were approached, and questionnaires were completed by the parents of the children after a face-to-face meeting between research staff and the parents. A second visit was made to the schools if necessary to recruit pupils who were absent at the initial visit.

Ethical approval for the study was given by the Ministry of Higher Education and the Ministry of Education, Damascus, Syria.

Variables

The ISAAC Phase Three survey for 6–7-year-old pupils consisted of a compulsory core questionnaire and an optional EQ.[1] The questionnaires were designed by the ISAAC Steering Committee and validated for specificity and sensitivity. The English language questionnaire was translated into each country language and back-translated into English. The detailed methodology employed by ISAAC Phase Three has already been published in detail elsewhere.[16]

The core questionnaire, including separate modules for symptoms of asthma, rhinoconjunctivitis and eczema, was designed for ISAAC Phases One and Three.[1] The main outcome measures in this study, obtained from responses to the core questionnaires, were current prevalence of symptoms of asthma, rhinoconjunctivitis and eczema. Standard ISAAC definitions were used: current wheeze/current asthma symptoms[1,2] (wheezing or whistling in the chest in the past 12 months); wheezing ever (has your child ever had wheezing or whistling in the chest at any time in the past?); current rhinoconjunctivitis (in the past 12 months has your child had a problem with sneezing or a runny or blocked nose when he/she did not have a cold? If yes, was this accompanied by itchy, watery eyes?). Persistence of symptoms and uncontrolled chronic disease was measured by sleep disturbance (being woken by asthma symptoms in the past 12 months one or more nights per week), while severe episodes were indicated by attacks of speech-limiting wheeze. The core questionnaire contained questions about nocturnal dry cough and exercise-induced wheeze in the past 12 months.

The Phase Three EQ looked at associations between environmental risk factors and the main clinical outcomes.[1,2] The EQ included questions about exposure to passive smoking of cigarettes;[1,2] for the Syria Tartous Centre, we added exposure to passive narghile smoke, as narghile is traditionally used in the region.

The ISAAC EQ questions on smoking were as follows:

1 Does your child's mother (or female guardian) smoke cigarettes?
2 Does your child's father (or male guardian) smoke cigarettes?

Our added questions were:

3 Does your child's mother (or female guardian) smoke narghile at home?
4 Does your child's father (or male guardian) smoke narghile at home?

In our comparative paper, we did not track the quantity smoked, as there is no standardised validated method for quantifying narghile smoking. Descriptions of sessions of narghile smoking show how difficult it is to assess the quantity of tobacco smoked.[14,15]

Data collection

Using the translated Arabic version, parents were met by the research team and asked to fill out the core questionnaire and EQ for their children following a brief explanation from the research staff.

Analysis

Data checks were undertaken by the IIDC in Auckland, New Zealand, which ensured adherence to the protocol. Prevalence values for the main outcomes were generated at the IIDC in Auckland, and analysed using SAS version 9 (Statistical Analysis System Institute Inc, Cary, NC, USA). Additional analyses were completed in Syria for χ^2 and odds ratios (ORs), and SPSS version 17 (Statistical Package for the Social Sciences, Chicago, IL, USA) was used to measure the

association of main outcomes with risk factors of the EQ. Our article focuses on the impact of passive smoking of narghile and/or cigarettes on wheezing symptoms, cough and rhinoconjunctivitis. No imputation was performed for missing data, as previous analyses had shown that little or no bias was introduced by limiting the multivariate analyses to children with complete data.[2]

Finally, after viewing the first results of cross-sectional associations, a logistic regression model was used using SPSS version 1 to calculate the relative excess risk due to interaction (RERI) and synergy index (S) for mother smoking cigarette and narghile. These measures of biological interactions between risk factors measure the additional risk experienced as a result of combined exposures. The recommended reporting of interactions is to report each effect separately then the combined effects compared with the unexposed group. This method allows one to use the unexposed group as reference to evaluate interaction on both additive and multiplicative scales.

RESULTS

The characteristics of the 2 734 pupils analysed are given in Table 1. The sex ratio was approximately 1, and the mean age was 6.6 years (±0.5). More than half of fathers (56%) and almost 20% of mothers were current cigarette smokers; 15% of children had two current cigarette smoker parents. A total of 9.3% of fathers and 7.3% of mothers were current narghile smokers; 3% of children had two current narghile-smoker parents. Nocturnal cough in the past 12 months was the most frequent symptom (16.6%), followed by ever wheezing (11.6%).

Table 2 shows the association between parental cigarette smoking and respiratory symptoms in children. There were cross-sectional associations of respiratory symptoms with exposure to cigarette smoking at home. Compared with non-exposed children, there was a significant association between exposure to ETS of the mother and ever wheezing (OR 1.576), nocturnal cough in the past 12 months (OR 1.296), severe wheezing limiting speech (OR 1.737) and rhinoconjunctivitis (OR 1.859). The association between passive smoking from the mother and wheezing in the past 12 months (current asthma symptoms) showed borderline significance ($P = 0.059$). We did not observe significant associations between paternal cigarette smoking in the home and respiratory symptoms. When both parents smoked cigarettes, we observed a cross-sectional association with sleep disturbance and exercise wheeze (Table 2).

Table 3 shows the association between parental narghile smoking and respiratory symptoms in children. Compared with non-exposed children, there was a significant association between exposure to ETS from the mother and ever wheezing (OR 1.749),

Table 1 Characteristics of subjects ($n = 2\,734$)

Characteristic	*n* (%)
Female	1345 (0.49)
Age, year, mean (±SD)	6.6 (±0.5)
BMI, kg/m^2, mean (±SD)	15.6 (±2.3)
Cigarette smoking	
Father currently smoking	1534 (0.56)
Mother currently smoking	541 (0.20)
Both parents currently smoking	419 (0.15)
Narghile smoking	
Father currently smoking	256 (0.09)
Mother currently smoking	201 (0.07)
Both parents currently smoking	95 (0.03)
Smoking both narghile and cigarette	
Father currently smoking	188 (0.07)
Mother currently smoking	76 (0.03)
Both parents currently smoking	38 (0.02)
Respiratory symptoms	
Wheezing ever	317 (0.12)
Wheeze in the past 12 months	156 (0.06)
Sleep disturbance from wheeze, ⩾1 nights a week in the past 12 months	18 (0.01)
Sleep disturbance from wheeze, <1 night a week in the past 12 months	146 (0.05)
Speech limited by wheeze in the past 12 months	64 (0.02)
Wheeze during or after exercise in the past 12 months	113 (0.04)
Night cough in the past 12 months	453 (0.17)
Rhinoconjunctivitis	155 (0.06)

SD = standard deviation; BMI = body mass index.

Table 2 Association between parental cigarette smoking and symptoms in subjects aged 6–7 years

Symptom	*P* value	OR
Current wheeze		
Father currently smoking	0.159	1.268 (0.910–1.767)
Mother currently smoking	0.059	1.430 (0.985–2.075)
Both parents currently smoking	0.105	1.4 (0.93–2.11)
Wheeze during or after exercise		
Father currently smoking	0.373	1.191 (0.881–1.749)
Mother currently smoking	0.065	1.49 (0.972–2.291)
Both parents currently smoking	0.04	1.606 (1.02–2.54)*
Severe wheezing (speech limiting)		
Father currently smoking	0.071	1.619 (0.956–2.744)
Mother currently smoking	0.044	1.737 (1.008–2.995)*
Both parents currently smoking	0.068	1.717 (0.95–3.09)
Sleep disturbance due to wheeze		
Father currently smoking	0.14	1.151 (0.954–1.390)
Mother currently smoking	0.175	1.170 (0.932–1.468)
Both parents currently smoking	0.044	1.288 (1.01–1.65)*
Night cough in the past 12 months		
Father currently smoking	0.124	1.741 (0.957–1.441)
Mother currently smoking	0.035	1.296 (1.018–1.650)*
Both parents currently smoking	0.037	1.322 (1.02–1.72)*
Ever wheezing		
Father currently smoking	0.222	1.160 (0.914–1.471)
Mother currently smoking	0.001	1.576 (1.204–2.061)*
Both parents currently smoking	0.026	1.403 (1.04–1.89)*
Rhinoconjunctivitis		
Father currently smoking	0.208	1.254 (0.881–1.783)
Mother currently smoking	0.001	1.859 (1.276–2.707)*
Both parents currently smoking	0.003	1.818 (1.21–2.73)*

* Statistically significant.
OR = odds ratio.

Table 3 Association between parental *narghile* smoking and symptoms in subjects aged 6–7 years

Symptom	*P* value	OR
Current wheeze		
Father currently smoking	0.337	1.282 (0.771–2.133)
Mother currently smoking	0.081	1.591 (0.941–2.691)
Both parents currently smoking	0.107	1.774 (0.88–3.6)
Wheeze during or after exercise		
Father currently smoking	0.074	1.636 (0.949–2.823)
Mother currently smoking	0.036	1.841 (1.032–3.284)*
Both parents currently smoking	0.057	2.219 (1.05–4.7)
Wheezing ever		
Father currently smoking	0.088	1.374 (0.952–1.982)
Mother currently smoking	0.004	1.749 (1.194–2.560)*
Both parents currently smoking	0.023	1.829 (1.08–3.1)*
Night cough in the past 12 months		
Father currently smoking	<0.001	1.966 (1.460–2.649)*
Mother currently smoking	0.007	1.599 (1.134–2.254)*
Both parents currently smoking	0.001	2.177 (1.38–3.43)*
Severe wheezing (Speech limiting)		
Father currently smoking	0.009	2.294 (1.208– 4.357)*
Mother currently smoking	<0.001	3.029 (1.590–5.773)*
Both parents currently smoking	0.002	3 (1.26–7.14)*
Sleep disturbance from wheeze		
Father currently smoking	<0.001	2.01 (1.590–2.777)*
Mother currently smoking	<0.001	1.923 (1.407–2.629)*
Both parents currently smoking	<0.001	2.138 (1.39–3.3)*
Rhinoconjunctivitis		
Father currently smoking	0.063	1.603 (0.970–2.650)
Mother currently smoking	0.098	1.594 (0.913–2.781)
Both parents currently smoking	0.053	2.05 (1.01–4.17)*

* Statistically significant.
OR = odds ratio.

Table 4 Association between parental cigarette and *narghile* smoking in subjects aged 6–7 years

Symptom	*P* value	OR
Current wheeze		
Father currently smoking	0.286	1.362 (0.77–2.41)
Mother currently smoking	0.038	2.3 (1.12–4.7)*
Both parents currently smoking	0.062	2.55 (0.98–6.64)
Wheeze during or after exercise		
Father currently smoking	0.22	1.49 (0.79–2.83)
Mother currently smoking	0.554	1.299 (0.47–3.62)
Both parents currently smoking	0.206	2.015 (0.61–6.65)
Wheezing ever		
Father currently smoking	0.053	1.495 (0.99–2.25)
Mother currently smoking	0.003	2.265 (1.3–3.94)*
Both parents currently smoking	0.035	2.406 (1.13–5.13)*
Night cough in the past 12 months		
Father currently smoking	<0.001	2.296 (1.65–3.2)*
Mother currently smoking	0.003	2.105 (1.27–3.49)*
Both parents currently smoking	0.003	2.666 (1.35–5.25)*
Severe wheezing (speech limiting)		
Father currently smoking	0.011	2.59 (1.3–5.18)*
Mother currently smoking	0.002	4.629 (2.04–10.5)*
Both parents currently smoking	0.058	3.703 (1.11–12.4)
Sleep disturbance from wheeze		
Father currently smoking	<0.001	2.25 (1.64–3.09)*
Mother currently smoking	<0.001	2.625 (1.64–4.2)*
Both parents currently smoking	0.001	2.884 (1.5–5.53)*
Rhinoconjunctivitis		
Father currently smoking	0.113	1.585 (0.89–2.81)
Mother currently smoking	0.053	2.306 (1.09–4.9)*
Both parents currently smoking	0.12	2.267 (0.79–6.48)

* Statistically significant.
OR = odds ratio.

dry nocturnal cough in the past 12 months (OR 1.599), speech-limiting wheeze (OR 3.029) and exercise-induced wheeze (OR 1.841). The association between passive smoking from the mother and wheezing in the past 12 months showed borderline significance ($P = 0.081$).

We observed significant associations between paternal narghile smoking in the home with nocturnal cough (OR 1.966) and with speech-limiting wheeze (OR 2.494) in children. When both parents smoked narghile in the home, similar but stronger cross-sectional associations of respiratory symptoms in children were seen when compared with exposure to parental cigarette smoking (Table 3).

Table 4 shows the association between children exposed to both narghile and cigarette smoking at home and respiratory symptoms. Mother smoking both narghile and cigarettes appears to be associated with current asthma symptoms (wheezing in the past 12 months) (OR 2.05, $P = 0.053$). However, when mothers smoked both cigarettes and narghile, neither relative excess risk (RERI) nor synergy values (which indicate the separate and combined effect of the two types of smoking by the mother) were found to be statistically significant (Table 5).

DISCUSSION

Syria is the first country to include questions about narghile smoking in the ISAAC EQ, and to report an association between narghile smoking of the mother or the father to be associated with nocturnal cough, ever wheezing and severe wheezing episodes. We found passive smoking of cigarettes of the mother and not the father to be associated with ever wheezing, severe wheeze and cough. However, the association with the ETS from the mother's narghile smoking was stronger than ETS from the mother's cigarette smoke.

The association between mother's narghile or cigarette smoking and current wheeze (current asthma symptoms) was borderline, but if the mother smoked narghile and cigarettes, the association

Table 5 Association between combinations of the two types of smoking by the mother and symptoms of asthma and rhinoconjunctivitis in subjects aged 6–7 years (reference group is mother smokes neither *narghile* nor cigarettes)

Symptom	Mother smokes cigarettes only OR (95%CI)	Mother smokes *narghile* only OR (95%CI)	Mother smokes both cigarette and *narghile* OR (95%CI)	RERI OR (95%CI)	Synergy index OR (95%CI)
Current wheeze	1.296 (0.86–1.96)	1.241 (0.6–2.61)	2.438* (1.18–5.00)	0.901 (−1.07–2.87)	2.677 (0.27–26.44)
Wheezing ever	1.49* (1.11–2.00)	1.56 (0.94–2.6)	2.51* (1.44–4.38)	0.46 (−1.15–2.06)	1.43 (0.42–4.86)
Night cough in the past 12 month	1.196 (0.92–1.56)	1.36 (0.86–2.14)	2.21* (1.33–3.68)	0.67 (−0.62–1.94)	2.19 (0.47–10.18)
Rhinoconjunctivitis	1.78* (1.18–2.67)	1.33 (0.61–2.95)	2.65* (1.23–5.68)	0.54 (−1.74–2.82)	1.48 (0.30–7.45)
Severe symptoms (speech-limiting)	1.34 (070–2.58)	2.11 (0.82–5.45)	5.14* (2.23–11.89)	2.69 (−1.83–7.21)	2.85 (0.50–16.20)
Sleep disturbance from wheeze	1.02 (0.79–1.31)	1.54* (1.02–2.32)	2.69* (1.68–4.32)	1.13 (−0.27–2.53)	3.01 (0.74–12.29)

* Statistically significant.
RERI = relative excess risk due to interaction between the two smoking exposures; OR = odds ratio; CI = confidence interval.

became significant (OR 2.05); however, this is only an additive, non-synergic effect. Cigarette smoking, but not narghile, was associated with rhinoconjunctivitis, except when both parents smoked narghile. When both parents smoked cigarettes, the association with sleep disturbance become significant; however, the OR was higher when both parents smoked narghile.

Our findings for cigarette smoking are consistent and in line with medical literature; epidemiological reports on passive narghile smoking and wheezing symptoms and rhinoconjunctivitis in children are limited. Many epidemiological studies have reported an association between the increase in wheezing prevalence in infants exposed to ETS in utero or post natally, of early asthma onset and severity of asthma symptoms in children exposed to ETS in their homes,[3–6,9] the persistence of asthma in adulthood,[5] and a decrease in lung function, especially in asthmatics.[17] General reviews[5,17] and meta-analyses[4,6,7] have reported ETS to be associated with an increased risk of asthma onset in children and asthma severity. Some ISAAC centres, for example in France and Singapore, have reported an association between cigarette smoke ETS and current asthma symptoms and rhinoconjunctivitis.[5] Other ISAAC centres found an association with nocturnal dry cough only.[10] We know that asthma, post nasal drip and oesophageal reflux are major causes of nocturnal cough, and cough-variant asthma has been identified in the medical literature.[18] In our study, we also found an association between cigarette ETS from the mother, but not from the father, and cough, while father or mother smoking narghile is associated with cough. In some studies, exposure to father's cigarette smoking was less likely to be associated with wheezing symptoms than mother's smoking;[2,5] however, we did not find any association between exposure to father's cigarette smoke and severe wheeze limiting speech. Other studies have reported role of ETS in asthma severity, persistency and control,[5,19] but none of these dealt with water pipe smoke.

Narghile smoking is widespread in the Middle East.[14,15] Mohammad et al. reported 35% cough/wheeze in 100 children aged <8 years exposed to household narghile ETS in Syria vs. 12% in controls.[20] Tamim et al. surveyed 625 students aged 10–15 years in Lebanon; the OR of having chronic cough and/or wheeze among children exposed to narghile or cigarette smoke at home were respectively 2.3 and 3.2;[21] however, there are concerns about the methodology used by these studies.[15]

The strength of our study is that as part of the ISAAC collaboration, the ISAAC methodology was used for the study and the study underwent rigorous verification of methodology and data quality.[16] Researchers have found that the influence of susceptible genes for asthma might not be apparent unless there is appropriate environmental exposure, especially of mother smoking or allergens,[11,12] leading to epigenetic changes,[12,13] which enable particles of cigarette smoke[19] or narghile smoke[22] to provoke oxidative injury and inflammation, leading to T-helper 2 secretion profile and immunoglobulin E-mediated sensitisation.[5,23]

The main limitations in our study are that diagnosing asthma in children aged <5 years is difficult due to multiple non-asthma causes of early childhood wheeze, and that the diagnosis relies mainly on clinical judgment. Two phenotypes have recently been proposed, 1) episodic viral wheeze, and 2) multiple-trigger wheeze,[24] indicating that the clinical progression from the episodic viral to multiple-trigger with atopic features defines asthma, but not clinical presentation of early wheeze.

The European Respiratory Society discourages the use of the term 'asthma' in pre-school children aged <5 years.[25] Therefore, in the ISAAC questionnaire, 'wheezing ever' may not reflect asthma at 6 years but current wheeze, i.e., wheeze in the past 12 months, as the outcome measure, most probably does. Experts suggest that current wheeze (wheeze in the last 12 months) captures many individuals with very mild asthma.[2,26]

The 2004 Global Burden of Asthma report notes

that airway hyper-responsiveness challenge tests in clinical practice are positive in only 50% of individuals reporting current wheeze. However, the report concluded that hyper-responsiveness is not a good marker for asthma in populations, and questionnaire-based prevalence is an appropriate methodology for epidemiological studies, which supports studies such as ISAAC.[26] Other confounders, such as family history of asthma or allergy and in utero exposure to ETS of cigarette or narghile, were not adjusted for.[4]

We recommend including questions not only on cigarettes but also on narghile smoking to accommodate other local habits[27] in all surveys on passive smoking and asthma or allergies in children.

In conclusion, by including questions on narghile smoking to the ISAAC III EQ in Syria, we showed a stronger association between exposure to narghile smoke than cigarette smoke and symptoms of asthma. For future research using the ISAAC questionnaires, it would therefore be appropriate to modify the ISAAC EQ to include local practices of narghile smoking.

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References

1 Ellwood P, Asher M I, Beasley R, Clayton T O, Stewart A W, on behalf of the ISAAC Steering Committee and the ISAAC Phase Three Study Group. ISAAC Phase Three Manual. Auckland, New Zealand: ISAAC International Data Centre, 2000.
2 Mitchell E A, Beasley R, Keil U, Montefort S, Odhiambo J, and the ISAAC Phase Three Study Group. The association between tobacco and the risk of asthma, rhinoconjunctivitis and eczema in children and adolescents: analyses from Phase Three of the ISAAC programme. Thorax 2012; 67: 941–949.
3 US Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta, GA, USA: US Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
4 Vork K L, Broadwin R L, Blaisdell R J. Developing asthma in childhood from exposure to secondhand tobacco smoke: insights from a meta-regression. Environ Health Perspect 2007; 115: 1394–1400.
5 Baena-Cagnani C E, Maximiliano Gómez R, Baena-Cagnani R, Walter Canonica G. Impact of environmental tobacco smoke and active tobacco smoking on the development and outcomes of asthma and rhinitis. Curr Opin Allergy Clin Immunol 2009; 9: 136–140.
6 Burke H, Leonardi-Bee J, Hashim A, et al. Prenatal and passive smoke exposure and incidence of asthma and wheeze: systematic review and meta-analysis. Pediatrics 2012; 129: 735–744.
7 Tinuoye O, Pell J P, Mackay D F. Meta-analysis of the association between secondhand smoke exposure and physician-diagnosed childhood asthma. Nicotine Tob Res 2013; 15: 1475–1483.
8 Mohammad Y, Tabbah K, Mohammad S, Yassine F, Clayton T, Hassan M. International study of asthma and allergies in childhood: Phase 3 in the Syrian Arab Republic. East Mediterr Health J 2010; 16: 710–716.
9 Tanaka K, Miyake Y, Arakawa M, Sasaki S, OhyaY. Prevalence of asthma and wheeze in relation to passive smoking in Japanese children. Ann Epidemiol 2007; 17: 1004–1010.
10 Vlaski E, Stavric K, Seckova L, Kimovska M, Isjanovska R. Do household tobacco smoking habits influence asthma, rhinitis and eczema among 13–14 year-old adolescents. Allergol Immunopathol 2011; 39: 39–44.
11 Antó J M, Pinart M, Akdis M, et al. WHO Collaborating Centre on Asthma and Rhinitis (Montpellier). Understanding the complexity of IgE-related phenotypes from childhood to young adulthood: mechanisms of the Development of Allergy (MeDALL) Seminar. J Allergy Clin Immunol 2012; 129: 943–954.
12 Myers D. Mechanisms of asthma and allergies. What we learned. J Allergy Clin Immunol 2010; 128: 440–446.
13 Bouzigon E. Effect of 17q21 variants and smoking exposure in early-onset asthma. N Engl J Med 2008; 359: 1985–1994.
14 Mohammad Y, Kakah M, Mohammad Y. Chronic respiratory effect of narghileh smoking compared with cigarette smoking in women from the East Mediterranean region. Int J Chron Obstruct Pulmon Dis 2008; 3: 405–414.
15 Chaouachi K. Hookah (shisha, narghile) smoking and environmental tobacco smoke (ETS). A critical review of the relevant literature and the public health consequences. Int J Environ Res Public Health 2009; 6: 798–843.
16 Ellwood P, Asher M I, Beasley R, Clayton T O, Stewart A W, and the ISAAC Steering Committee. The international study of asthma and allergies in childhood (ISAAC): Phase Three rationale and methods. Int J Tuberc Lung Dis 2005; 9: 10–16.
17 Sherrill D L, Martinez F D, Lebowitz M D, et al. Longitudinal effects of passive smoking on pulmonary function in New Zealand children. Am Rev Respir Dis 1992; 145: 1136–1141.
18 Iyer V N, Lim K G. Chronic cough: an update. Mayo Clin Proc 2013; 88: 1115–1126.
19 Wirth N, Bohadana A, Spinosa A, Martinet Y. Les pathologies respiratoires liées au tabagisme passif (Respiratory impact of passive smoking). Rev Fr Allergol 2009: 26: 667–678.
20 Mohammad Y. Hubble-bubble (narguileh): a female pattern of smoking. In: Lu R, Mackay J, Niu S, Peto R, eds. Tobacco: the growing epidemic. Proceedings of the Tenth World Conference on Tobacco or Health, 24–28 August 1997, Beijing, People's Republic of China. Heidelberg, Germany: Springer, 1997: pp 18–20.
21 Tamim H, Musharrafieh U, El-Roueiheb Z, Yunis K, Almaw W Y. Exposure of children to environmental tobacco smoke (ETS) and its association with respiratory ailments. J Asthma 2003; 40: 571–576.
22 Al-Numair K, Barber-Heidal K, Al-Assaf A, El-Desoky G. Water-pipe (shisha) smoking influences total antioxidant capacity and oxidative stress of healthy Saudi males. J Food Agric Environ 2007; 5: 17–22.
23 Gill M A. The role of dendritic cells in asthma. J Allergy Clin Immunol 2012; 129: 889–900.
24 Castro-Rodriguez J A, Holberg C J, Wright A L, et al. A clinical index to define risk of asthma in young children with recurrent wheezing. Am J Respir Crit Care Med 2000; 162: 1403–1406.
25 Brand P L, Baraldi E, Bisgaard H, et al. Definition, assessment and treament of wheezing disorders in preschool children: an evidence-based approach. Eur Respir J 2008; 32: 1096–1110.
26 Masoli M, Fabian D, Holt S, Beasley R, Global Initiative for Asthma (GINA) programme. The Global Burden of Asthma: executive summary of the GINA Dissemination Committee Report. Allergy 2004; 59: 469–478.
27 Gupta D, Aggarwal A N, Jindal S K. Pulmonary effects of passive smoking: the Indian Experience. Tob Induc Dis 2002; 15: 129–136.

RESUME

CADRE : L'association entre tabagisme environnemental et symptômes de l'asthme est bien documentée. Mais la relation causale n'était pas conclusive. L'International Study of Asthma and Allergies in Childhood (ISAAC) Phase Trois était le premier à décrire un effet dose-réponse entre le sifflement actuel (considéré comme symptôme d'asthme actuel) et tabagisme passif des parents. En Syrie, des questions concernant l'exposition aux fumées de *narghile*, qui est traditionnelle, ont été ajoutés à ISAAC Phase Trois au centre Tartous.

MÉTHODES : Les parents des écoliers âgés de 6–7 années ont rempli un questionnaire sur les symptômes et les facteurs environnementaux dont l'exposition au tabagisme passif de cigarettes ; nous avons ajouté des questions sur le narghile.

RÉSULTATS : Un total de 2 734 écoliers ont été inclus. Nous avons trouvé une association entre l'exposition au tabagisme maternel de cigarette ou narghile, et sifflement dans la vie, toux nocturne et épisodes sévères de sifflement. L'association était plus forte pour le narghile maternel, et le sifflement durant l'exercice était également associé au narghile maternel. Père fumeur de narghile mais pas de cigarette était associé aux toux, épisodes sévères de sifflement et sifflement à l'exercice. Une association avec l'exposition au tabagisme maternel et le sifflement actuel (au cours des 12 derniers mois) est devenue significative quand la mère fumait narghiles et cigarettes, mais l'association est additive et non-synergétique.

CONCLUSION : Nous recommandons que des questions sur l'exposition au narghile soit inclues dans toute enquête sur le tabagisme environnemental.

RESUMEN

MARCO DE REFERENCIA: La asociación entre la exposición ambiental al humo de tabaco (ETS) y los síntomas de asma se ha documentado ampliamente, pero su relación causal no ha sido conclusiva. El informe de la Fase Tres del estudio ISAAC presentó por primera vez una relación de dosis y respuesta entre la presencia de sibilancias y la exposición al humo del cigarrillo por el tabaquismo de los padres. La exposición de los niños al humo del *narguile* representa un motivo de preocupación en Siria y por esta razón, en la Fase Tres del proyecto ISAAC en el centro de la ciudad de Tartous se examinó también el papel que desempeña el consumo parental de narguile.

MÉTODOS: Los padres de niños de 6 años o 7 años de edad completaron por escrito un cuestionario básico con preguntas sobre la prevalencia de síntomas y un cuestionario ambiental sobre otros factores de riesgo como el tabaquismo de los padres. Se añadieron preguntas sobre el consumo del narguile.

RESULTADOS: El estudio abarcó 2 734 alumnos (49% de sexo femenino). Se observó una asociación entre la ETS de las madres que consumían ya fuese cigarrillos o narguile y algún antecedente de sibilancias, tos nocturna y sibilancias graves, pero la asociación más fuerte se encontró con las madres que consumían narguile. El uso del narguile por las madres se asoció también con las sibilancias durante el ejercicio. El consumo de narguile por parte del padre, mas no el consumo de cigarrillos, se asoció con la tos nocturna, las sibilancias graves y las sibilancias durante el ejercicio. La asociación de sibilancias actuales se hizo significativa cuando la madre consumía cigarrillos y narguile; sin embargo, el efecto fue aditivo y no sinérgico.

CONCLUSIÓN: Se recomienda que los estudios internacionales que investigan los efectos del ETS incluyan preguntas sobre el consumo de narguile.