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BRIEF COMMUNICATION

Parents' educational level and second-hand tobacco smoke exposure at home in a sample of Portuguese children

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Abstract Second-hand tobacco smoke (SHS) exposure is a major and entirely avoidable health risk for children's health, well-being and development. The main objective of the current study was to investigate the association between parents' educational level and children's SHS home exposure.

A self-administered questionnaire was conducted within a sample of 949 students in 4th grade (mean age 9.56 ± 0.75, 53.4% male). The sample was randomly selected from all schools located at Lisbon District, Portugal.

The current study confirmed that Portuguese children are exposed to unacceptable high levels of SHS at home, mainly by their parents' smoke. Prevalence of smokers was higher amongst parents with low educational level. Children of parents with low educational level were more likely to suffer SHS exposure at home. These results confirmed the social inequalities associated with smoking, support the relevance of more research on this subject and stress the need for more interventions to control this problem. Some interventions should be specifically aimed at less educated parents, particularly at less educated mothers.

Introduction

Worldwide, about 600 000 premature deaths per year are attributable to second-hand tobacco smoke (SHS),

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of which 28% are children.[1,2] SHS exposure is a major and entirely avoidable risk for children with serious consequences for their health and development, including nasal, eye and airways irritation, middle ear disease, wheezing, cough and dyspnea, asthma and pneumonia, compromised lung function and growth, increased risk of sudden infant death syndrome.[2,3] Furthermore, SHS exposure has been associated with increased risk of neurodevelopmental delay, low neurocognitive performance and poor academic achievement.[4] Besides all these, children exposed to parents' and siblings' smoking behavior are more likely to start smoking in the future.[2,5]

Despite these consequences, more than 40% of children worldwide are exposed to SHS, mainly at home by parents, particularly in poorer families.[1,2] Equivalent figures on children's SHS exposure were found in Portugal.[6]

Socioeconomic status, parents' educational level and parental smoking behavior are associated with children's SHS exposure.[7,8] Interventions to prevent this hazard have not been effective, which demands more research and investment to improve the results of these interventions.[9] The current study investigates the association between parents' educational level and (1) their smoking behavior status, and (2) their children's SHS home exposure.

Methods

During the school year of 2010/2011 a self-administered questionnaire was distributed to 949 students in the 4th grade (mean age 9.56 ± 0.75 years old, range 8–13, 53.4% boys). Participants were from 31 schools randomly selected from all schools of Lisbon District (Portugal). From each selected school, two 4th grade classes were randomly chosen to be included in the study.[6]

The project and the questionnaire used were approved by the Ministry of Education and by the Schools Board of Directors. Head teachers received guidelines about how to collect parents' written consent and to administer the questionnaire. Teachers distributed the questionnaires in the classroom supported by a written protocol. Missing parents' authorization was the main reason for participants lost (nearly 30%).

The questionnaire was developed and validated for this project.[6] It includes questions on children's Age and Sex, Fathers' and Mothers' Educational level (<10 years, 10–12 years and >12 years-university), Fathers' and Mothers' smoking behavior (no-yes) and Children's exposure to SHS at home (no-yes).

Frequencies, contingency tables, chi-squared tests, Cramer's V and simple logistic regression were performed using IBM-SPSS version 22 for Windows.

Results

In the main sample, 42.8% of fathers and 37.6% of mothers smoked, 27.7% of fathers and 25.4% of mothers smoked at home. Regarding only the smokers, 64.8% of fathers and 67.6% of mothers smoked at home exposing their children to SHS hazards.

Data missing in questions about fathers' and mothers' educational level was high (between 37.1% and 44.7), but differences between the included and excluded participants in mothers' and in fathers' smoking behavior and in children's SHS exposure were not statistically significant.

Relating to this study subsample, 47.4% of fathers and 37.8% of mothers smoked (Table 1). Smoking behavior was associated with educational level of fathers ($V = 0.14$, $p = 0.005$) and mothers ($V = 0.11$, $p = 0.040$). The prevalence of fathers who smoke was high at lowest educational level (54.4%) and low at highest (38.7%). Mothers in the middle educational level had the highest smoking prevalence (43.4%), followed by mothers with lowest educational level (39.9%).

In this subsample, 48.3% of children with fathers who smoke and 47.6% of children with mothers who smoke were exposed to SHS at home (Table 2). Children's SHS exposure was associated with fathers' ($V = 0.11$, $p = 0.030$) and mothers' ($V = 0.13$, $p = 0.010$) educational level. The biggest difference in children's SHS exposure was between fathers with low educational level (54.0%) and fathers with middle educational level (42.4%).

Among mothers, the middle educational level category had the highest prevalence of smokers (Table 1). However, the low educational level category had more children exposed to SHS at home (Table 2).

Despite the big difference between fathers and mothers smoking prevalence (respectively, 47.4% and 37.8%, Table 1), the difference in the rate of children exposed to SHS at home by fathers and by mothers was not relevant (respectively, 48.3% and 47.6%, Table 2), suggesting that the rate of smokers who smoke at home is higher amongst mothers.

A simple logistic regression analyses confirmed that fathers and mothers educational level influenced children's SHS exposition ($p = 0.03$ and $p = 0.010$, respectively). Children of fathers and mothers with low educational level were, respectively, 1.57 times more [$p = 0.032$; $CI_{OR(95\%)} = (1.04;2.37)$] and 1.80 times more [$p = 0.003$; $CI_{OR(95\%)} = (1.23;2.64)$] likely to be exposed to SHS at home than children of fathers and mothers with highest educational level.

Discussion

The current study has confirmed (1) the existence of unacceptably high levels of children exposed to SHS in Portuguese homes, (2) in line with published studies, prevalence of smokers is higher amongst parents with low educational level,[7,8] and (3) the risk of children's SHS exposure at home increases when parents have a low educational level.[8,9] Prevalence of smoking in mothers was lower than in fathers, but the absolute risk of children's SHS exposition at home was similar, suggesting that the rate of smokers who smoke at home is higher amongst mothers. Mothers' middle educational level category showed the highest prevalence of smokers, indicating that Portugal is still in stage II of the cigarette epidemic model of Lopez et al.[10] However, amongst mothers, as amongst fathers, the highest rate of children exposed was found in the category with low educational level.

This study has limitations, namely, data obtained by self-report, using only a subset of the population (4th grade students), the tender age of participants (some may

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