

The Association of Autism Spectrum Disorders with Second Hand Tobacco Exposure

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Background

Autism spectrum disorders (ASDs) are a range of complex neurodevelopmental disorders characterized by social impairments, social difficulties, and restricted, repetitive and stereotyped patterns of behavior. One in 68 children suffer from ASDs in the United States (Centers for Disease Control, n.d.). The exact causes of ASDs are still unclear but genes and environment are thought to play an important role (Schieve et al., 2012).

Purpose

To evaluate the relationship between second hand tobacco smoke exposure and autism spectrum disorders in children in the United States.

Methods

Subjects: The data for this study were taken from the 2011/2012 National Survey of Children's Health. Children less than 12 years of age were considered for this study. Out of 94,677 children included in the survey, 43,418 children were selected for analysis for whom data for autism, smoking and other demographic variables were complete.

Variables: The parent-reported physician diagnosis of current autism, Asperger's disorder, childhood pervasive developmental disorder, or other autism spectrum disorder was considered as the outcome variable for this study.

Tobacco smoke exposure was selected as the exposure variable. It was derived from the parent-reported exposure of children to tobacco smoke both inside and outside the house.

Age, gender of the child, race/ethnicity, primary language, birth weight, prematurity, mother's self-reported mental health status, socioeconomic status of the family, mother's age and educational status, family structure and generational status of the household were selected as the covariates.

Statistical Analysis: IBM SPSS version 22 was used for the analysis. Descriptive analysis was performed on all the variables selected, both for outcome (ASD) and exposure (smoking) variables. Logistic regression (unadjusted and adjusted) was performed to determine the association between outcome and exposure variable. A significance level of $p < 0.05$ was used for all analyses.

Results

The mean age of children diagnosed with ASD in this study population was 6.5 years. Overall, 23.6% of children were exposed to second hand smoking and 4.8% were exposed to second hand smoking inside the house (Figure 1).

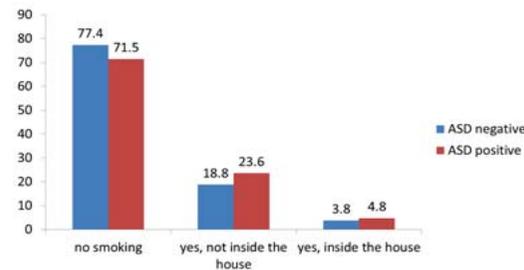


Figure 1. Smoking habits of parents of children with/without ASD.

Unadjusted logistic regression showed that second hand smoking is associated with 36% greater odds of developing ASD (Figure 2).

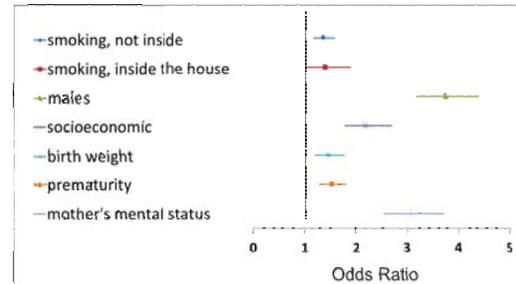


Figure 2. Univariate logistic regression/odds ratios.

When adjusted for covariates, the association of ASD with smoking lost its significance (Table 1).

Table 1. Multivariate Logistic Regression

Model	Odds ratio (95% CI)	P-values
Model 1*		
Smokes, no	Reference	<0.001
Smokes, not inside	1.36 (1.17, 1.58)	<0.001
Smokes, inside the house	1.39 (1.03, 1.88)	0.031
Model 2**		
Smokes, no	Reference	<0.001
Smokes, not inside	1.38 (1.184, 1.61)	<0.001
Smokes, inside the house	1.31 (0.97, 1.78)	0.077
Model 3***		
Smokes, no	Reference	0.126
Smokes, not inside	1.15 (0.97, 1.35)	0.104
Smokes, inside the house	0.87 (0.63, 1.19)	0.376

Note: * Model 1 was unadjusted
** Model 2 was adjusted for age, gender and race/ethnicity
*** Model 3 was adjusted for age, gender, race/ethnicity, socioeconomic status, birth weight, prematurity, mother's age, mother's education, primary language, family structure and generational status of the household

Discussion and Conclusion

Discussion

A large number of children are still being exposed to second hand tobacco smoke, both inside and outside the house, due to smoking practices of parents and caregivers.

The risk of ASD in this study population was found to be significantly higher in male children, in children belonging to lower socioeconomic status, and in those who were born prematurely or had low birth weight. The risk was also significantly higher in children born to mothers with poor self-reported mental health status. The risk is significantly lower in children whose parents were recent immigrants.

Prenatal environmental factors and parental psychopathology are significantly associated with the risk of ASD and these factors seem to act independently which is in agreement with similar other studies (Larsson et al., 2005). Environmental factors before and during pregnancy may act as triggers for genetic defects and lead to development of ASD in the offspring (Rai et al., 2012).

Conclusion

Second hand smoking, either outside or inside the house, is not significantly associated with increased risk of ASD in children. Prenatal, perinatal and other demographic factors are important predisposing factors for ASD and affect the relationship seen between ASD and second hand smoking.

References

- Centers for Disease Control and Prevention (CDC). (n.d.). Retrieved March 2014 from <http://www.cdc.gov/features/dsautismdata/>
- Larsson, H. J., Eaton, W. W., Madsen, K. M., Vestergaard, M., Olesen, A. V., Agerbo, E., . . . Mortensen, P. B. (2005). Risk factors for autism: Perinatal factors, parental psychiatric history, and socioeconomic status. *American Journal of Epidemiology*, 161(10), 916-925.
- Rai, D., Lewis, G., Lundberg, M., Araya, R., Svensson, A., Dalman, C., . . . Magnusson, C. (2012). Parental socioeconomic status and risk of offspring autism spectrum disorders in a Swedish population-based study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(5), 467-476.
- Schieve, L. A., Boulet, S. L., Blumberg, S. J., Kogan, M. D., Yeargin-Allsopp, M., Boyle, C. A., . . . Rice, C. (2012). Association between parental nativity and autism spectrum disorder among US-born non-Hispanic white and Hispanic children, 2007 national survey of children's health. *Disability and Health Journal*, 5(1), 18-25.