**TITLE:** Second Hand Smoke and Pregnant Women: Clinical Evidence

**DATE:** 07 February 2012

**RESEARCH QUESTION**

What is the clinical evidence regarding the effect of second hand smoke on the health of pregnant women and their unborn children?

**KEY MESSAGE**

The evidence identified suggests maternal exposure to second hand smoke may result in negative outcomes for both mothers and their unborn children.

**METHODS**

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2012, Issue 1), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials and non-randomized studies containing safety data. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2007 and January 25, 2012. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.
RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials and non-randomized studies.

Three systematic reviews and ten non-randomized studies were identified regarding the effect of second hand smoke on the health of pregnant women and their unborn children. No health technology assessment reports or randomized controlled trials were identified. Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

One systematic review\(^1\) sought to determine the risk of adverse fetal outcomes of secondhand smoke exposure in nonsmoking pregnant women. The authors found that nonsmoking pregnant women’s exposure to secondhand smoke significantly increased the risk of stillbirth and congenital malformation; however, it was not significantly associated with elevated risk of spontaneous abortion. A second systematic review\(^2\) investigated the effect of environmental tobacco smoke exposure (ETS) on perinatal outcomes. It was found that pregnant women exposed to ETS had an increased risk of having infants with lower birthweight, congenital anomalies, longer newborn lengths, and trends towards smaller head circumferences and lower birth weight (LBW). A third systematic review\(^3\) examined the effects of ETS during pregnancy and birth outcomes. Nonsmoking pregnant women exposed to ETS experienced reduced mean birth weight and increase in the risk of LBW, however, exposure did not have an effect on size for gestational age.

The ten non-randomized studies\(^4\)-\(^{13}\) identified varied in terms of objectives, methods, and results. All studies\(^4\)-\(^{13}\) found associations between maternal exposure to ETS and adverse birth outcomes. A summary of study characteristics and key findings can be found in Table 1.

<table>
<thead>
<tr>
<th>Author and Date</th>
<th>Objective</th>
<th>Results and Conclusions</th>
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<tbody>
<tr>
<td>Benedict et al. 2011(^4)</td>
<td>Determine the rate of ova implantation and IVF success in nonsmoking women exposed to STS</td>
<td>STS exposure significantly increased the risk of implantation failure and decreased the odds for a live birth</td>
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<tr>
<td>Ben-Haroush et al. 2011(^5)</td>
<td>Assess the effect of passive and active smoking on pregnancy rates after IVF transfer of embryos</td>
<td>Active smoking significantly decreased pregnancy rates (i.e. transfer of embryos); however, no difference was observed in pregnancy rates by passive smoking women</td>
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<tr>
<td>Crane et al. 2011(^6)</td>
<td>Assess the effects of ETS on perinatal outcomes in nonsmoking pregnant women</td>
<td>ETS exposure was associated with LBW, smaller head circumference, shorter birth length, stillbirth, and a trend towards preterm birth and neonatal sepsis</td>
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<tr>
<td>Ashford et al. 2010(^7)</td>
<td>Examine the relationship between maternal exposure to prenatal STS, preterm birth, and immediate neonatal outcomes</td>
<td>STS exposure was associated with increased risk for preterm birth, respiratory distress syndrome, immediate newborn complications, and</td>
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### Table 1: Characteristics and key findings of identified non-randomized studies

<table>
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<tbody>
<tr>
<td>Khader et al. 2010</td>
<td>Determine the association between maternal exposure to STS and preterm birth and LBW</td>
<td>STS exposure was associated with increased odds of LBW and preterm birth compared to non-exposed women</td>
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<td>Zhang et al. 2010</td>
<td>Determine the risk factors for RSA in women</td>
<td>ETS exposure, BMI and a family history of RSA was associated with increased risk of RSA; however, active smoking, alcohol consumption, and coffee consumption were not associated with increased risk of RSA</td>
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<td>de Assis et al. 2009</td>
<td>Assess the level of DNA damage in lymphocytes of active and passive smoking mothers and in their newborns</td>
<td>Active smoking women and their newborns showed significant increases of DNA damage compared to passive and nonsmokers</td>
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<tr>
<td>Leite &amp; Koifman 2009</td>
<td>Investigated the associations between family history of malformations, parental consanguinity, smoking and alcohol drinking and nonsyndromic orofacial cleft</td>
<td>STS exposure to nonsmoking pregnant women was associated with cleft lip (with or without cleft palate) but not with cleft palate alone</td>
</tr>
<tr>
<td>Tsui et al. 2008</td>
<td>Investigated whether prenatal ETS exposure to pregnant women increased newborn genetic damage and adverse birth outcomes</td>
<td>Newborns of ETS exposed mothers had the highest cord blood DNA scores and was associated with decreased birth weight, shorter birth length, and decreased head circumference compared to newborns with no smoking exposure</td>
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<td>Wu et al. 2007</td>
<td>Determine the effect of ETS on maternal DNA damage</td>
<td>Smokers and ETA exposed subjects had significantly higher levels of DNA damage compared to nonsmokers. In addition, there was greater risk of DNA damage to ETS exposed subjects compared to non-exposed subjects</td>
</tr>
</tbody>
</table>

BMI = Body Mass Index; ETS = environmental tobacco smoke; LBW = lower birth weight; NICU = Neonatal Intensive Care Unit; RSA = recurrent spontaneous abortion; STS = secondhand tobacco smoke
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses


Randomized Controlled Trials
No literature identified.

Non-Randomized Studies


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APPENDIX – FURTHER INFORMATION:

Non-randomized controlled studies - qualitative methodology


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Review Articles

