

EFFECTS OF ENVIRONMENTAL TOBACCO SMOKE ON THE RESPIRATORY HEALTH OF CHILDREN

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ABSTRACT

Infections of the respiratory tract are the most common acute illness of childhood. Apart from the morbidity (and occasional mortality) attributable to respiratory infections, they also represent risk factors for asthma and possibly other chronic respiratory effects in later life. Children's exposure to harmful substances of tobacco smoke begins at prenatal period, if pregnant woman smokes after the delivery, it continues postnatally to be paced. Children are especially sensitive to the respiratory effects of environmental tobacco smoke (ETS) exposure. ETS exposure is a significant & avoidable risk factor for respiratory diseases among children. ETS is a wide-spread environmental pollutant that has been long linked with respiratory problems. In children of all ages ETS exposure has been found to be associated with increased respiratory symptoms such as wheeze and cough. The role ETS plays in the development of atopy is of great interest, as atopy is closely related to the development of childhood asthma. Exposure to environmental tobacco smoke is preventable. This review discusses primarily on impact of ETS on during the fetal period and infancy and childhood. This paper reviews of several articles between year 1992- 2009 obtained from the internet; Pubmed and Medline.

KEYWORDS: Environmental Tobacco Smoke, Children; Respiratory Diseases.

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INTRODUCTION

Environmental Tobacco Smoke (ETS) or passive cigarette smoking exposure is a major public health concern.¹⁻⁴ Exposure to passive smoking in children is associated especially with increased upper and lower respiratory infection and increased asthmatic symptoms.

Globally, including Turkey the percentage of children exposed to environmental tobacco smoke is considerably high.⁴ In Turkey, smoking rates increased by 89% from 1984 to 2000.⁵ Turkey has the second highest cigarette consumption rate among European countries after Greece. The PIAR (Marketing and Public Research Organization), a national foundation that conducts community and marketing surveys, conducted a nation-wide population-based study in Turkey in 1988. In this study it was determined that 62,8% of men and 24,3% of women above 15 years of age were smoking, the overall smoking rate was 43,6%.⁶

Thousands of chemicals are released during tobacco burning as gases, vapors and particles. ETS is one of the most important and wide-spread toxic exposures to be found in the indoor environment of children. Exposure to ETS

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during early life is associated with many adverse health effects, such as childhood chronic respiratory symptoms, infections and Sudden Infant Death Syndrome.¹⁻³ Children are the most susceptible group for ETS exposure because their bronchial tubes are smaller and their immune systems are less developed, making them more likely to develop respiratory and aural consequences if exposed to cigarette smoke. They also breathe faster and take in more harmful chemicals per kg body weight than adults. In 1999, the World Health Organization (WHO) estimated that almost half of the world's children were exposed to tobacco smoke from the 1.2 billion adults who smoked.⁷

Respiratory diseases are a major health burden in children. Respiratory diseases account for approximately one-third of the hospitalizations of children and adolescents less than 15 years of age in the United States, with asthma being one of the leading causes of hospitalization for children.⁸ A wide variety of factors have been identified as risks for respiratory disease. Prominent among these factors is environmental tobacco smoke (ETS).⁹

It's presumed that passive smoking is one of the most important environmental aspect which affecting babies and children's health negatively.^{10,11} Environmental tobacco smoke or second-hand smoke (SHS) causes illness and mortality in children, especially those under 5 years of age. Pre-school aged children are particularly vulnerable because of more prolonged exposure to their parents' smoking at home.⁷ Infants of smoking parents use medical health services significantly more often than infants of non-smoking parents.¹²

The first report concerning the adverse effects of environmental tobacco smoke (ETS) on children's health was published in 1967. Since that time, many studies of the effects of ETS on respiratory illness in children alone have been published.¹³ Children and pregnant women are particularly vulnerable to the health risks of exposure to environmental tobacco smoke (ETS). ETS is responsible for lower respiratory tract infections in an estimated 300,000 children each year. Among children younger than 18

years, an estimated 22 percent are exposed to secondhand smoke in their homes.¹⁴ Different Passive smoking rates (58.0 %, 59.9%, % and 53.4%) were reported for children in Turkey.^{10,15,16} The World Health Organization has called for strong public policies to protect children from exposure to tobacco smoke (WHO). This review will focus primarily on impact of ETS on during the fetal period and infancy and childhood.

Effects of maternal smoking in pregnancy on fetus' respiratory system: Cigarette smoking during pregnancy transiently lowers maternal uterine blood flow and reduces flow of oxygen from the uterus to the placenta. Increased levels of carboxyhemoglobin are found in both maternal and fetal blood when the mother smokes during pregnancy and this can lead to fetal hypoxia.¹³

Adverse outcomes that have been causally associated with prenatal tobacco exposure include premature rupture of membranes, preterm delivery, fetal growth restriction, and impaired pulmonary function among infants.¹⁷ Marakoglu and colleagues (2003)¹⁸ in their study at a city of Turkey found that the percentage of women who had smoked at any time during pregnancy was 17%. The percentage of women who smoked throughout pregnancy period was 9%.

Cigarette smoke during pregnancy can lead to profound adverse effects on fetal development. Nicotine is a habit forming substance found in tobacco smoke. It is a habit forming substance and is prescribed by health professionals to assist smokers to quit smoking. It is rapidly absorbed from the lungs of smokers. It crosses the placenta and accumulates in the developing fetus. Nicotine induces formation of oxygen radicals and at the same time also reduces the antioxidant capacity of the lungs. Nicotine and the oxidants cause point mutations in the DNA molecule, thereby changing the program that controls lung growth and maintenance of lung structure.¹⁹ Children's exposure to harmful substances of tobacco smoke begins at prenatal period, if pregnant woman smokes after the delivery, it continues postnatally.²⁰

There is both direct and indirect evidence that smoking in pregnancy adversely influences fetal development of the respiratory system.²¹

Up to now, the most epidemiologic research on respiratory health in early childhood was focused on postnatal ETS and other environmental risks. However, the lung is unusual in that its development incomplete at birth and respiratory function must undergo a very rapid and dramatic change at birth.²² It is becoming clear that not only perinatal and early childhood periods constitute a particularly vulnerable time during which air pollutants may exert harmful effects respiratory tract of infants.²³

The influence of parental smoking on a child's respiratory health begins during the fetal period and continues through infancy and childhood. Maternal smoking in pregnancy can be considered a type of prenatal fetal exposure to environmental tobacco smoke.²¹

There is a considerable amount of evidence of the relation between mothers' smoking during pregnancy and the emergence of respiratory diseases definitely, infections of the respiratory tract or isolated symptoms in their children.²⁴ Maternal smoking during pregnancy has been associated with an odds ratio of 3.8 for infant death as a result of respiratory disease (excluding conditions related to prematurity).¹³

The Surgeon General's Report lists among its many findings that secondhand smoke causes reduced birthweight and sudden infant death syndrome (SIDS), and suggests a relationship between secondhand smoke exposure and preterm birth as well as childhood cancer.²⁵

For smoking in pregnancy, ETS exposure may predict the development of asthma later in life. Successive studies showed that maternal smoking during pregnancy increases the risk of wheeze and asthma.^{20,26,27} Airway hyperresponsiveness has been reported to be increased soon after birth among infants of mothers who smoked in pregnancy.²⁸

Adverse affects of environmental tobacco smoke in postnatal period: Adverse effects of passive smoking occur from conception through adolescence.⁴ Exposure of infants and children to secondhand smoke (SHS) has also been

associated with a number of adverse health outcomes, including induction and exacerbation of asthma, otitis media and sudden infant death syndrome (SIDS).^{3,17} Exposure of children to environmental tobacco smoke increases the risk of lower respiratory illness, especially during the first two years of life.²⁹

Arvas and colleagues (2009)³⁰ in their studies related to evaluation of correlation between lower respiratory tract infection (LRTI) and passive smoking in children aged 0-24 months determined that the frequency of LRTI in children more than with exposure to passive smoking. In same study the children whose mothers were active smoker had more LRTI compared to those whose mothers were non smokers. (OR= 2.5, p= 0.026).

Asthma: Asthma is the most common chronic disease affecting youth worldwide. The prevalence of asthma has increased at least 3-fold during the past several decades.³¹ Asthma is a chronic respiratory condition characterized by airway inflammation and episodic airflow limitation. Depending on the clinical definition used, about 2-3 percent of adults and up to 10 percent of children may be affected. There is considerable evidence that continuing exposure to cigarette smoke results in the induction of asthma in children.³²

Exposure to second-hand cigarette smoke is associated with increased asthma incidence, increased rates of health care use and respiratory morbidity.^{3,33} ETS increases both the prevalence and the severity of asthma. Household smoking increases the frequency of attacks, the number of emergency department visits and the risk of intubation.¹³

Asthma and other respiratory diseases are a major health issue in childhood. They account for leading causes of visits to physicians and hospitalization with asthma being one of the main and increasing causes of hospitalization in young children and adolescents in many countries. The prevalence of asthma and wheezing symptoms in infants and children varies widely between populations and there is much controversy concerning the nature and meaning of early wheezing for respiratory health in

the course of adult life. Wheeze originates in airways which may be narrowed by compression or by intrabronchial or intraluminal obstruction (inflammatory mucosal edema, secretions or spasm) which causes an increase in velocity of gas through them with resultant oscillation. It is also suggested that wheezing lower respiratory illness (LRI) in the first year of life is a consequence of anatomically small airway unrelated to the later development of atopic asthma.²³

Wheezing and doctor-diagnosed asthma are more closely related to passive/environmental tobacco smoke in the preschool age range than in school-children 5–16 years of age, but such findings should not detract from the statement that the single most important measure to improve the health of children would be the exclusion of tobacco smoke from their indoor and outdoor environments.³⁴

Otitis Media: Otitis media (OM) is one of the most common childhood infections, the leading cause of doctors' visits by children, the most frequent reason children consume antibiotics or undergo surgery in developed countries.^{35,36}

Recurrent otitis media (ROM) is a frequent condition in children which may affect up to 40% of all young children during the first few years of life. The most children have at least one episode of AOM, with a peak incidence between ages 6 and 11 months; by age 3 years, 50–85% of children have had acute OM. ROM susceptibility is clearly multifactorial and includes genetic, environmental (e.g., passive cigarette smoking and allergies), microbial and other host-related factors (e.g., breastfeeding) with delayed language development and learning difficulties as possible long-term sequelae of ROM.^{35,37} There is no doubt that early childhood ETS exposure is causally associated with acute and chronic otitis media.³⁸ Parental smoking in the home at birth was the only environmental risk factor associated with AOM at age 10.^{35,39}

Several case-control and cohort studies have also found that children with middle ear disease are frequently exposed to environmental tobacco smoke.⁴⁰⁻⁴²

Sudden Infant Death Syndrome (SIDS): Sudden infant death syndrome (SIDS) or "cot death" has until the late eighties been a significant causes of death in children between the ages of one month and one year.⁴² Sudden death of an infant in the postneonatal period without any clinical and necropsy evidence (termed sudden infant death syndrome, SIDS) is the most common cause of death in the western world. Eventhough the reason of SIDS not clear, fetal oxygene deficiency is acceptable hypothesis.⁴ A number of risk factors for SIDS have been identified, of which parental smoking has been examined in many studies.^{4,13,29,43}

It concluded, Maternal smoking doubles the risk of sudden infant death syndrome. The relationship is almost certainly causal. The epidemiologic evidence points to a causal relationship between SIDS and postnatal exposure to environmental tobacco smoke.^{13,43}

CONCLUSION

The Convention on the "Rights of Child" states that all children have the right to access the highest health and medical care standards available, and to obtain a life standard that is adequate for their physical, psychological, moral and social development. Nonetheless, almost half the children around the world are exposed to environmental tobacco smoke. In such case, a variety of health problems may emerge in children.¹¹ Children exposure with negative effects of cigarette starting from prenatal period due to active smoking frequency is too high in adults in many developing countries as Turkey.^{4,30} It is important to understand the mechanisms through which ETS influences respiratory diseases in childhood to more effectively evaluate and implement interventions to reduce this burden.⁹ Exposure to ETS is responsible for increased burden on the family's financial resources and demands on health services.³ Exposure to secondhand smoke is preventable. Through the continued implementation of clean indoor air policies aimed at eliminating secondhand smoke exposure in workplaces, restaurants and bars, public spaces such as beaches and parks, there has been a significant

reduction in the level of secondhand smoke exposure in shared environments. However, preventing secondhand smoke exposure within the home environment continues to present a challenge.¹⁴

These findings indicate that educating parents with respect to the health effects of environmental tobacco smoke and emphasizing the benefits of a smoke-free environment for the child, as well as supporting the social situation can have an important impact on preventing the harmful consequences of exposure to environmental tobacco smoke.²¹ Public health policy needs estimates of the proportion of the child population exposed to ETS at all ages.¹ A healthy society and a healthy future are only possible by means of the children brought up by the families knowing the value of their own health and using the health care properly. It is very important that families protect their children from tobacco smoke exposure.

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