Health, 2014, 6, 1408-1414
Published Online June 2014 in SciRes. http://www.scirp.org/journal/health
http://dx.doi.org/10.4236/health.2014.612172

Passive Smoking and Children's Health

Luiz Antonio Del Ciampo, Ieda Regina Lopes Del Ciampo

Department of Puericulture and Pediatrics, Ribeirão Preto Medical School, University of São Paulo, São Paulo, Brazil
Email: delciamp@fmrp.usp.br

Received 29 April 2014; revised 2 June 2014; accepted 9 June 2014

Abstract

Tabagism is one of the greatest public health problems at the present time because this is the most important cause of preventabel deaths worldwide. Due to its impact on the health and welfare of all, the act of smoking causes problems for society, including that children, without being able to enjoy the freedom of choice, eventually become compulsory passive smokers since its conception. This article presents the main damages caused by smoking to human health, especially on children, who, because of their characteristics are more vulnerable to the effects of products derived from cigarette burns, mainly the effects of nicotine, carbon monoxide and more than 4700 substances produced by smoking. Also it highlights the importance that all efforts are directed towards protecting nonsmokers and improving environmental and health conditions for everyone.

Keywords

Tobacco, Passive Smoke, Environmental Pollution

1. Introduction

Smoking, a cause of multisystem disease, can be considered to be a chronic, progressive and contagious disease. It is one of the major public health problems of today since it is the most important cause of preventable deaths in the whole world. Due to its repercussions on the health and wellbeing of both active or passive smokers and nonsmokers, the act of smoking causes problems for society as a whole because of the large number of persons directly or indirectly reached by smoke. Among them are children who having no freedom of choice, ultimately become compulsory passive smokers since their conception [1].

Since the introduction of tobacco in Europe in the 15th century, the smoking habit has been socially accepted and, on some occasions, greatly encouraged, ultimately leading to a constantly increasing number of people consuming cigarettes and consequently being exposed to all the elements originating from their combustion. The

How to cite this paper: Del Ciampo, L.A. and Del Ciampo, I.R.L. (2014) Passive Smoking and Children's Health. *Health*, **6**, 1408-1414. http://dx.doi.org/10.4236/health.2014.612172

current estimate is that more than 1 billion people are smokers in the whole world (80% of them males) and that each day more than 80,000 persons, most of whom are young people, start smoking, especially in countries of lower socioeconomic level [2]. This huge contingent of smokers disseminates the products of cigarette burning to the rest of the world population. At present, approximately 30% of the world's population is exposed to secondhand smoke [3], and it has been estimated that more than 700 million children are exposed to cigarette smoke, with the consequent occurrence of 5 million deaths per year, and a projected estimate that about 1 billion people will die during the 21st century because of smoking, most of them due to respiratory diseases [4]. Most of the children are forced to inhale air contaminated by tobacco smoke in many places like playgrounds, schools, kindergartens and vehicles. England, every year, over 160000 children are adversely affected by tobacco smoking costing more than £ 23 million in health care [1] [3] [5].

The harmful effects of passive smoking on health have been known for more than 80 years. However, the interest in this topic has increased since 1967 when these effects were assessed in children [3] [6] [7]. Passive smoking is defined as involuntary exposure of nonsmoking individuals to the substances produced by tobacco combustion indoors. This expression was first used in 1939 and since then this topic has attracted increasing interest on the part of investigators because of its importance for public health [7].

2. Children: The Most Vulnerable Passive Smokers

Children, as growing and developing human beings, are extremely vulnerable to the harmful effects of passive smoking because of the following peculiarities: a) they spend more time of their life in the presence of their parents, caregivers and other adults, thus being unable to avoid exposure; b) they are unable to assess the risks present in the environment; c) they have immature and rapidly developing systems (respiratory, nervous and immunological systems); d) have a greater ventilation rate than adults; e) they receive proportionally greater doses during exposure because they inhale more polluting elements per body weight; f) low metabolic capacity; g) hand-to-mouth contact; longer life expectancy [8] [9].

3. Cigarette Smoke

This is a dynamic, heterogeneous and complex mixture consisting of more than 4700 chemical substances in the form of gases and particles that are generated during the burning of products derived from tobacco and from cigarette paper, which undergo dehydrogenation, oxidation, condensation, and rearrangements. All these elements cause inflammation and damage to cells. Tobacco smoke can migrate though windows, ventilation systems, walls, etc and can to affect people at several places far from the smoking local [10]. Indoor environmental tobacco smoke concentration depends of the number of cigarettes smoked in a period of time, the ventilation rate, the volume of the environment and other process that eliminate pollutants from de air [11].

For didactic purposes, cigarette smoke can be divided into:

1) First-hand smoke, *i.e.*, the smoke inhaled by a smoker, generated by the combustion of organic elements present in tobacco derivatives, which undergoes variations according to temperature, characteristics of the tobacco leaves, and the quantity of oxygen in the air [12].

2) Second-hand smoke: a mixture of the smoke emitted from the burning cigarette and the stream smoke exhaled from the lungs of the smokers. It is the smoke inhaled by non-smokers. Secondary stream (75%): it is the one originating in the tip of the lighted cigarette associated with the smoke exhaled by the smoker, *i.e.*, the passive cigarette combustion between puffs, which may contain higher concentrations of toxic substances than the main stream (tar, nicotine, carbon monoxide, and nitric oxide) [13].

3) Third-hand smoke: a pool of pollutants that remain on surfaces and in dust after tobacco has been smoked, re-emitted into the gas-phase or reacting with other compounds in the environment to form secondary pollutants that includes invisible smoke left in the air after a cigarette is extinguished. This smoke deposits on clothing, hair, furniture, curtains, carpet, toys and others surfaces, where it remains for several weeks. People may then come in contact with harmful elements such as phenols, cresols, formaldehyde, nicotine, napthalene, 3-ethinylpyridine and tobacco-specific nitrosamine by inhalation or ingestion and through the skin [14]-[17].

Cigarette smoke can also be divided into two phases according to its components. The gas phase (60%) mainly consists of nitrogen (73%), oxygen (10%), carbon dioxide (9.5%) and carbon monoxide (4.2%), also containing nitrogen oxides, nitrosamines, acetaldehyde, hydrazine, hydrocyanic acid, ammonia, vinylchloride, and acroleid. Environmental smoke tobacco causes effects on the respiratory system within the first few minutes

to smoke exposure and leads to decrease in forced expiratory volume in 1 second (FEV1) and in FEV1/forced vital capacity (FVC) ratio [18]. In turn, the particulate phase contains particles measuring on average 0.6 μm in diameter, a fact that favors their deposition in the upper airways, as well as other harmful elements such as nicotine, 4-aminobiphenyl, cresol, polynucelar hydrocarbonpehnol, carbazole, catechol, and indole [19].

4. Major Aggressive Components of Cigarette Smoke

Cigarette burning produces thousands of aggressive substances affecting the organism either by a direct action on tissues, interfering with enzymatic reactions by being deposited, or indirectly, reacting with other environmental elements.

5. Nicotine

Nicotine is a volatile colorless base extracted from tobacco leaves which acquires a brownish color when exposed to the air. It is classified as a psychoactive substance because of its action on the parasympathetic and sympathetics systems, increasing adrenaline discharge by the adrenal glands [20] and thus representing a strongly addictive substance. People exposed to high levels of environmental tobacco smoke may absorb amounts of nicotine comparable with light or non-daily smoking [21].

Nicotine is well absorbed by the oral membranes, the respiratory tract, the gastrointestinal tract, the bladder, and the skin. Since it weakly binds to proteins, it can be distributed throughout all tissues, also crossing the placental barrier and being excreted through maternal milk [22]. Nicotine is metabolized by the liver (90%), lungs, kidneys, brain, and respiratory epithelium. It acts as a mood stabilizer, increasing the ability to concentrate and intellectual performance, also having a chronic antidepressant effect leading to induced consumption by users. When inhaled, its effects on the central nervous system can be observed within less than 7 seconds. In maternal milk, nicotine has a half-life of 90 minutes and its concentration can reach 0.5 mg/liter among women who smoke more than 20 cigarettes per day, since women have a lower capacity to metabolize nicotine than men.

Besides being an important teratogen, nicotine causes changes in the structure and functioning of the organs, thus increasing the susceptibility to diseases, and also reacts with oxidant gases present in the environment and gives origin to nitrosamines and nitrosorcotinine, which are pulmonary carcinogens [23]. The main changes caused by nicotine in the organism are: nauseas, vomiting, diarrhea, changes in heart rate, increased arterial pressure, tremors, peripheral vasoconstriction, respiratory excitation, bronchoconstriction, increased bronchial and salivary secretion, and convulsions. Children display higher relative nicotine levels during and after exposure to environmental tobacco smoke than adults [24].

6. Carbon Monoxide

This is a not specific gas tobacco. This is one of the various gases produced by a burning cigarette which produces 20 to 60 thousand ppm, when the acceptable standard for good quality air is up to 9 ppm. It is a colorless, odorless, tasteless and toxic gas formed by the combustion of organic matter. In combination with nicotine, it is one of the major factors responsible for the acute toxicity of tobacco. It is a teratogenic element rapidly absorbed in the blood and can cause direct tissue damage or tissue hypoxia because of its high affinity for hemoglobin, giving origin to carboxyhemoglobin and leading to a reduced oxygen release to tissues [25] [26].

7. Cancerigenous Agents

Smoke contains more than 60 substances with a confirmed cancerigenous action, and the main ones are: benzopyrene, dibenzoanthracene, nitrosamines, formaldehyde, acetaldehyde, tar, dibenzoacridine, arsenic, polonium 210, cadmium, nickel, toluene, xylene, benzophenanthrene, dibenzefluorethane and levulinic acid with direct or indirect actions on the cells, reinforcing the enzymatic activities and/or having an additive action with other environmental pollutants.

8. Effects of Smoking on the Organism

A child is exposed to smoking since its conception, being submitted to the harmful effects of all the components

detected in the burning cigarette. The main effects on the child's organism can be divided into the following groups:

8.1. Effects of Transplacental Exposure of the Fetus

Nicotine induces vasoconstriction, alters placental blood flow and causes oxygen deprivation in the fetus [26]. The effects of pregnant active smoking during pregnancy on fetal outcomes are trimester and dose dependent, and may increase the risk of adverse health effects on the fetus such as lower Apgar scale results, smaller head circumference [27], gastrointestinal defects (gastroschisis, ventral, umbilical or inguinal hernia), heart, cardiovascular and muscleskelectal defects, craniosynostosis, oral cleft, eye anomalies, limb reduction defects, digit anomaly and clubfoot, cryptorchidism [7] [24] and significantly blunted response to treatment with inhaled corticosteroids in children who subsequently develop asthma [26] [28] [29]. In response to fetal smoke exposure occurs increased arterial resistance with left atrium and aortic root development in post natal life [30] and structural and functional changes in the central nervous system [31].

8.2. Breast Feeding and Passive Smoke

Maternal milk may also be contaminated with many components of cigarette smoke, which may have adverse effects on nursing infants. The main substances that can be transferred to the nursing infant through maternal milk are: nicotine, benzene, formaldehyde, cyanide, carbon monoxide, carbon dioxide, dichlorodipehnyltrichloroethane, hydrogen, ammonia, aluminium, arsenic, and lead [32]. In addition to having adverse effects on the child, smoking can also alter the composition of maternal milk and reduce the production of prolactin and milk, leading to early weaning [33].

8.3. Effects on Children

Among the many effects that smoking can have on the child, some should be highlighted: oxidant damage from free radicals generated through smoke [19]; blocks lymphocyte proliferation and differentiation including suppression of antibody formation [33]; may promote inflammation through oxidative stress; distorts adaptative T-cell-mediated immunity, impair responses to pathogens, and suppres anti0tumor immune cell function [34] may alter lung and brain development in children; reduces mucociliary activity [35], alters the vascular permeability of the respiratory epithelium, causes hyperplasia of mucosal glands and increases mucus production; impaired lung function and increased respiratory symptoms [36]; compromises endothelial function, arterial elasticity and arterial intima-media thickness [37]-[39]; increases the risk of overweight and obesity [40]; increases the risk of dyslipidemia [41]; increases arterial pressure [42]; atherosclerosis [43]; risk of development of asthma and worsening of pre-existing asthma [44]; could express significant direct genotoxic effects in human cells [22]; increases sensitization to allergens and levels of total IgE; sudden infant death syndrome; changes in sleep and wake patterns [32]; pyloric stenosis, obesity, neurosensory hearing loss; increased risk of iodine deficiency and thyroid stimulating hormone [33]. In addition to these, other possible effects of passive smoking have been recently documented [45], such as adversely affects cognitive ability, language skill, and fine-motor function [46]-[49], diabetes mellitus type 2 [50], chronic pain in the head, back, joints and abdominal cavity [51], multiple sclerosis [52] and changes in the oral flora [53], increased risk of hospitalization for respiratory syncytial virus lower respiratory tract infection [54].

9. Conclusion

The harmful effects of smoking have been long known and little has been done so far to avoid their consequences for health. It is known that there is no safe level of exposure to tobacco smoke and that millions of children continue to be dangerously exposed to passive smoking [55]. Every person, and especially every child, has the right to grow and live in healthy, clean and safe environments, protected from the effects of passive smoking [56]. The most effective means of protecting children from passive smoke is to reduce de prevalence of smoking in adults. Banning smoking in public places outside of the home, including workplaces, restaurants and bars leading to improved air quality in those locations [10] [57], because elimination of exposure to second-hand smoke is associated with immediate positive effect on respiratory function [58]-[60]. Combating these effects should be one of the priorities of public health, accepted as a moral duty of society as a whole.

References

[1] WHO (2011) WHO Report on the global tobacco epidemic, 2011. WHO, Geneva.

[2] Lando, H.A., Hipple, B.J., Muramoto, M., Kelin, J.D., Prokhorov, A.V., Ossip, D.J. and Winickoff, J.P. (2010) Tobacco Control in Children: An International Perspective. *Pediatric Allergy, Immunology and Pulmonology*, **23**, 99-103. http://dx.doi.org/10.1089/ped.2010.0012

[3] Örberg, M., Jaakola, M.S., Woodward, A., Peruga, A. and Prüss-Ustin, A. (2011) Worldwide Burden of Disease from Exposure to Second-Hand Smoke: A Retrospective Analysis of Data from 192 Countries. *Lancet*, **377**, 139-146. http://dx.doi.org/10.1016/S0140-6736(10)61388-8

[4] Coelho, S.A., Rocha, S.A. and Jong, L.C. (2012) Consequências do tabagismo passivo em crianças. *Ciências e Cuidados de Saúde*, **11**, 294-301.

[5] US Department of Health and Human Services (2014) A Report of the Surgeon General: How Tobacco Smoke Causes Disease: What It Means to You. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.

[6] Pattermore, P.K. (2013) Tobacco or Healthy Children: The Two Cannot Co-Exist. *Frontiers in Pediatrics*, **1**, 1-9.

[7] Colley, J.R., Holland, W.W. and Corkhill, R.T. (1974) Influence of Passive Smoking and Parental Phlegm on Pneumonia and Bronchitis in Early Childhood. *Lancet*, **2**, 1031-1034. http://dx.doi.org/10.1016/S0140-6736(74)92148-5

[8] Snodgrass, W.R. (1992) Physiological and Biochemical Differences between Children and Adults as Determinants of Toxic Response to Environmental Pollutants. In: Guzelian, P.S., Henry, C.J. and Olin, S.S., Eds., *Similarities and Differences between Children and Adults*: *Implications for Risk Assessment*, ILSI Press, Washington DC, 35-42.

[9] WHO (2002) Children's Health and Environment: A Review of Evidence. WHO Regional Office for Europe, Copenhagen (Environmental Issue Report, No. 29).

[10] Wilson, K.M., Klein, J.D., Blumkin, A.K., Gottlieb, M. and Winickoff, J.P. (2011) Tobacco-Smoke Exposure in Children Who Live in Multiunit Housing. *Pediatrics*, **127**, 85-92. http://dx.doi.org/10.1542/peds.2010-2046

[11] Apelberg, B.J., Hepp, L.M., Avila-Tang, E., Gundel, L., Hammond, S.K., Hovell, M.F., Hyland, A., Klepeis, N.E., *et al*. (2013) Environmental Monitoring of Secondhand Smoke Exposure. *Tobacco Control*, **22**, 147-155. http://dx.doi.org/10.1136/tobaccocontrol-2011-050301

[12] Maritz, G.S. and Mutemwa, M. (2012) Tobacco Smoking: Patterns, Health Consequences for Adults and the Long-Term Health of the Offspring. *Global Journal of Health Science*, **4**, 62-68. http://dx.doi.org/10.5539/gjhs.v4n4p62

[13] Sureda, X., Fernández, E., López, M.J. and Nebot, M. (2013) Second Hand Tobacco Smoke Exposure in Open and Semi-Open Settings: A Systematic Review. *Environmental Health Perspective*, **121**, 766-773. http://dx.doi.org/10.1289/ehp.1205806

[14] Winickoff, J.P., Friebely, J. and Tanski, S.E. (2009) Beliefs about the Health Effects of "Thirdhand" Smoke and Home Smoking Bans. *Pediatrics*, **123**, e74-e79. http://dx.doi.org/10.1542/peds.2008-2184

[15] Sleiman, M., Gundel, L.A., Pankow, J.F., Jacob, P., Singer, B.C. and Destaillats, H. (2010) Formation of Carcinogens Indoors by Surface-Mediated Reactions of Nicotine with Nitrous Acid, Leading to Potential Thirdhand Smoke Hazards. *Proceedings of the National Academy of Sciences of the United States of America*, **107**, 6576-6781. http://dx.doi.org/10.1073/pnas.0912820107

[16] Matt, G.E., Quintana, P.J., Destaillats, H., *et al*. (2011) Thirdhand Tobacco Smoke: Emerging Evidence and Arguments for a Multidisciplinary Research Agenda. *Environmental Health Perspective*, **19**, 1218-1226. http://dx.doi.org/10.1289/ehp.1103500

[17] Ferrante, G., Simoni, M., Cibella, F., Ferrara, F., Liotta, G., Malizia, V., Corsello, G., Viegi, G. and La Grutta, S. (2013) Third-Hand Smoke Exposure and Health Hazards in Children. *Monaldi Archives for Chest Disease*, **79**, 38-43.

[18] Fluoris, A.D. and Koutedakis, Y. (2011) Immediate and Short-Term Consequences of Secondhand Smoke Exposure on the Respiratory System. *Current Opinion in Pulmonary Medicine*, **17**, 110-115. http://dx.doi.org/10.1097/MCP.0b013e328343165d

[19] Al-Sayed, E.M. and Ibrahim, K.S. (2012) Second-Hand Tobacco Smoke and Children. *Toxicology and Industrial Health*, **5**, 1-10.

[20] Treviño, L.J., FernÁNdez, M.T.B., GonzÁLez, M.P.G., MartÍNez, A.S., GarcÍA, M.B. and GarcÍA, J.B. (2004) La Nicotina Como Droga. *Adicciones*, **16**, 143-153.

[21] Schuck, K., Kleinjan, M., Otten, R., Engles, R.C.M.E. and Difranza, J.R. (2013) Responses to Environmental Smoking in Never-Smoking Children: Can Symptoms of Nicotine Addiction Develop in Response to Environmental Tobacco Smoke Exposure? *Journal of Psychopharmacology*, **27**, 533-540. http://dx.doi.org/10.1177/0269881112466184

[22] Demirhan, O., Demir, C., Tunç, E., Inandiklioglu, N., Sütcü, E., Sadikoglu, N. and Özcan, B. (2011) The Genotoxic

Effect of Nicotine on Chromosomes of Human Fetal Cells: The First Report Described as an Important Study. *Inhalation Toxicology*, **23**, 829-834. http://dx.doi.org/10.3109/08958378.2011.617398

[23] Burton, A. (2011) Does the Smoke Ever Really Clear? Thirdhand Smoke Exposure Raises New Concerns. *Environmental Health Perspective*, **119**, A70-A74. http://dx.doi.org/10.1289/ehp.119-a70

[24] Yamada, H., Bishnoi, M., Keijzers, K.F.M., van Tuijl, I.A., Small, E., Shah, H.P., Bauzo, R.M., Kobeissy, F.H., Sabarinath, S.N., Derendorf, H. and Bruijnzeel, A.W. (2010) Preadolescent Tobacco Smoke Exposure Leads to Acute Nicotine Dependence but Does Not Affect the Rewarding Effects of Nicotine or Nicotine Withdrawal in Adulthood in Rats. *Pharmacology Biochemistry and Behavior*, **95**, 401-409. http://dx.doi.org/10.1016/j.pbb.2010.02.018

[25] Ziaei, S., Nouri, K. and Kazemnejad, A. (2005) Effects of Carbon Monoxide Air Pollution in Pregnancy on Neonatal Nucleated Red Blood Cells. *Paediatric and Perinatal Epidemiology*, **19**, 27-30. http://dx.doi.org/10.1111/j.1365-3016.2004.00619.x

[26] Bakker, H. and Jaddoe, V.W.V. (2011) Cardiovascular and Metabolic Influences of Fetal Smoke Exposure. *European Journal of Epidemiology*, **26**, 763-770. http://dx.doi.org/10.1007/s10654-011-9621-2

[27] Emre, Y., Semra, A. and Selda, İ.Ç. (2014) Effect of Active Smoking during Pregnancy on Women and Newborn Health. *Journal of Child Health and Nutrition*, **3**, 1-10. http://dx.doi.org/10.6000/1929-4247.2014.03.01.1

[28] Cohen, R.T., Raby, B.A., Van Steen, K., Fuhlbrigge, A.L., Celedón, J.C., Rosner, B.A., Strunk, R.C., Zeiger, R.S. and Weiss, S.T. (2010) *In utero* Smoke Exposure and Impaired Response to Inhaled Corticosteroids in Children with Asthma. *Journal of Allergy and Clinical Immunology*, **126**, 491-497. http://dx.doi.org/10.1016/j.jaci.2010.06.016

[29] Hackshaw, A., Rodeck, C. and Boniface, S. (2011) Maternal Smoking in Pregnancy and Births Defects: A Systematic Review Based on 173687 Malformed Cases and 11.7 Million Controls. *Human Reproduction Update*, **17**, 589-604. http://dx.doi.org/10.1093/humupd/dmr022

[30] Geelhoed, J.J.M., El Marroun, H., Verburg, B.O., Van Osch Gever, L., Hofman, A., Huizink, A.C., Moll, H.A., Verhulst, F.C., Helbing, W.A., Steegers, E.A.P. and Jaddoe, V.W.V. (2011) Maternal Smoking during Pregnancy, Fetal Arterial Resistance Adaptations and Cardiovascular Function in Childhood. *International Journal of Obstetrics and Gynaecology*, **118**, 755-762. http://dx.doi.org/10.1111/j.1471-0528.2011.02900.x

[31] Key, A.P., Ferguson, M., Molfese, D.L., Peach, K., Lehamn, C. and Molfese, V.J. (2007) Smoking during Pregnancy Affects Speech-Processing Ability in Newborn Infants. *Environmental Health Perspective*, **115**, 623-629. http://dx.doi.org/10.1289/ehp.9521

[32] Del Ciampo, L.A., Almeida, C.A.N. and Ricco, R.G. (1999) A Criança Como Fumante Passiva CompulsóRia. *Revista Paulista de Pediatria*, **17**, 74-78.

[33] Primo, C.C., Ruela, P.B.F., Brotto, L.D.A., Garcia, T.R. and Lima, E.F. (2013) Effects of Maternal Nicotine on Breastfeeding Infants. *Revista Paulista de Pediatria*, **31**, 392-397. http://dx.doi.org/10.1590/S0103-05822013000300018

[34] Lee, J., Taneja, V. and Vassallo, R. (2012) Cigarette Smoking and Inflammation: Cellular and Molecular Mechanisms. *Journal of Dental Research*, **91**, 142-149. http://dx.doi.org/10.1177/0022034511421200

[35] Habesoglu, M., Demir, K., Yumusakhuylu, A.C., Yilmaz, A.S. and Oysu, C. (2012) Does Passive Smoking Have an Effect on Nasal Mucociliary Clearance? *Otolaryngology-Head and Neck Surgery*, **147**, 152-156. http://dx.doi.org/10.1177/0194599812439004

[36] Moszczynski, P., Zabinski, Z., Moszczynski Jr., P., Rutowski, J., Slowinski, S. and Tabarowski, Z. (2001) Immunological Findings in Cigarette Smokers. *Toxicology Letters*, **118**, 121-127. http://dx.doi.org/10.1016/S0378-4274(00)00270-8

[37] Keskinoglu, P., Cimrin, D. and Askakoglu, G. (2007) Relationships between Cotinine, Lower Respiratory Tract Infections and Eosinophil Cationic Protein in Children. *European Journal of Pediatrics*, **166**, 455-459. http://dx.doi.org/10.1007/s00431-006-0263-4

[38] Kallio, K., Jokinen, E., Hamalianem, M., Saarinen, M., Volanen, I., Kaitosaari, T., Viikari, J., Rönnemaa, T., Simell, O. and Raitakari, O.T. (2009) Decreased Aortic Elasticity in Healthy 11-Year-Old Children Exposed to Tobacco Smoke. *Pediatrics*, **123**, e267-e273. http://dx.doi.org/10.1542/peds.2008-2659

[39] Kallio, K., Jokinen, E., Saarinen, M., Hamalainen, M., Volanen, I., Kaitosaari, T., Ronnemaa, T., Viikari, J., Raitakari, O.T. and Simell, O. (2010) Arterial Intima-Media Thickness, Endothelial Function, and Apolipoprotein in Adolescents Frequently Exposed to Tobacco Smoke. *Circulation*: *Cardiovascular Quality and Outcomes*, **3**, 196-203. http://dx.doi.org/10.1161/CIRCOUTCOMES.109.857771

[40] Kum-Nji, P., Meloy, L. and Herrod, H.G. (2006) Environmental Tobacco Smoke Exposure: Prevalence and Mechanisms of Causation of Infections in Children. *Pediatrics*, **117**, 1745-1754. http://dx.doi.org/10.1542/peds.2005-1886

[41] Juonala, M., Magnussen, C.G. and Raitakari, O.T. (2013) Parental Smoking Produces Long-Term Damage to Vascular Function in Their Children. *Current Opinion in Cardiology*, **28**, 569-574.

[42] Raum, E., Kupper-Nybelen, J., Lamers, A., Hebebrand, J., Herpertz-Dahlmann, B. and Brenner, H. (2011) Tobacco

Smoke Exposure before, during and after Pregnancy and Risk of Overweight at Age 6. *Obesity*, **19**, 2411-2417. http://dx.doi.org/10.1038/oby.2011.129

[43] Neufeld, E.J., Mietus-Snyder, M., Beiser, A.S., Baker, A.L. and Newburger, J.W. (1997) Passive Cigarette Smoking and Reduced HDL Cholesterol Levels in Children with High-Risk Lipid Profiles. *Circulation*, **96**, 1403-1407. http://dx.doi.org/10.1161/01.CIR.96.5.1403

[44] Simonetti, G.D., Schwertz, R., Klett, M., Hoffmann, G.F., Schaefer, F. and Wühl, E. (2011) Determinants of Blood Pressure in Preschool Children: The Role of Parental Smoking. *Circulation*, **123**, 292-298. http://dx.doi.org/10.1161/CIRCULATIONAHA.110.958769

[45] Cuthbertson, L. and Britton, J. (2010) Passive Smoking and Children's Health. *Clinical Medicine*, **10**, 113-114. http://dx.doi.org/10.7861/clinmedicine.10-2-113

[46] Juonala, M., Magnussen, C.G., Venn, A., Gall, S., Kahonen, M., Laitinen, T., Taittonen, L., Lehtimaki, T., Jokinen, E., Sun, C., Viikari, J.S.A., Dwyer, T. and Raitakari, O.T. (2012) Parental Smoking in Childhood and Brachial Artery Flow-Mediated Dilatation in Young Adults: The Cardiovascular Risk in Young Finns Study and the Childhood Determinants of Adult Health (CDAH) Study. *Arteriosclerosis, Thrombosis and Vascular Biology*, **32**, 1024-1031. http://dx.doi.org/10.1161/ATVBAHA.111.243261

[47] Chen, R., Clifford, A., Lang, L. and Anstey, K.J. (2013) Is Exposure to Secondhand Associated with Cognitive Parameters of Children and Adolescents? A Systematic Review. *Annals of Epidemiology*, **23**, 652-661. http://dx.doi.org/10.1016/j.annepidem.2013.07.001

[48] Clifford, A., Lang, L. and Chen, R.L. (2012) Effects of Maternal Cigarette Smoking during Pregnancy on Cognitive Parameters of Children and Young Adults: A Literature Review. *Neurotoxicology and Teratology*, **34**, 560-570. http://dx.doi.org/10.1016/j.ntt.2012.09.004

[49] Cheraghi, M. and Salvi, S. (2009) Environmental Tobacco Smoke (ETS) and Respiratory Health in Children. *European Journal of Pediatrics*, **168**, 897-905. http://dx.doi.org/10.1007/s00431-009-0967-3

[50] Ko, K.P., Min, H., Ahn, Y., Park, S.J., Kim, C.S., Paark, J.K. and Kim, S.S. (2011) A Prospective Study Investigating the Association between Environmental Tobacco Smoke Exposure and the Incidence of Type 2 Diabetes in Never Smokers. *Annals of Epidemiology*, **21**, 42-47. http://dx.doi.org/10.1016/j.annepidem.2010.10.006

[51] Pisinger, C., Aadahl, M., Toft, U., Birke, H., Zytphen-Adeler, J. and, Jorgensen, T. (2011) The Association between Active and Passive Smoking and Frequent Pain in a General Population. *European Journal of Pain*, **15**, 77-83. http://dx.doi.org/10.1016/j.ejpain.2010.05.004

[52] Hedström, A.K., Bäärnhielm, M., Olsson, T. and Alfredsson, L. (2011) Exposure to Environmental Tobacco Smoke Is Associated with Increased Risk for Multiple Sclerosis. *Multiple Sclerosis*, **17**, 788-793. http://dx.doi.org/10.1177/1352458511399610

[53] Brook, I. (2010) Effects of Exposure to Smoking on the Microbial Flora of Children and Their Parents. *International Journal of Pediatric Otorhinolaryngology*, **74**, 447-450. http://dx.doi.org/10.1016/j.ijporl.2010.01.006

[54] DiFranza, J.R., Masaquel, A., Barrett, A.M., Colosia, A.D. and Mahadevia, P.J. (2012) Systematic Literature Review Assessing Tobacco Smoke Exposure as a Risk Factor for Serious Respiratory Syncytial Virus Disease among Infants and Young Children. *BMC Pediatrics*, **12**, 81-96. http://dx.doi.org/10.1186/1471-2431-12-81

[55] Department of Health and Human Services (2010) How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General. CDC, Atlanta.

[56] Avsar, A., Darka, O., Topaloglu, B. and Bek, Y. (2008) Association of Passive Smoking with Caries and Related Salivary Biomarkers in Young Children. *Archives of Oral Biology*, **53**, 969-974. http://dx.doi.org/10.1016/j.archoralbio.2008.05.007

[57] Menzies, D. (2011) The Case for a Worldwide Ban on Smoking in Public Places. *Current Opinion in Pulmonary Medicine*, **17**, 116-122. http://dx.doi.org/10.1097/MCP.0b013e328341ce98

[58] Mackay, D., Haw, S., Ayres, J., Fischbacher, C. and Pell, J. (2010) Smoke-Free Legislation and Hospitalizations for Childhood Asthma. *New England Journal of Medicine*, **363**, 1139-1145. http://dx.doi.org/10.1056/NEJMoa1002861

[59] Glantz, S. and Gonzales, M. (2012) Effective Tobacco Control Is Key to Rapid Progress in Reduction of Non-Communicable Diseases. *Lancet*, **379**, 1269-1271. http://dx.doi.org/10.1016/S0140-6736(11)60615-6

[60] Jacobs, M., Alonso, A.M., Sherin, K.M., Koh, Y., Dhamija, A., Lowe, A. and ACPM Prevention Practice Committee (2013) Polices to Restrict Secondhand Smoke Exposure. *American Journal of Preventive Medicine*, **45**, 360-367. http://dx.doi.org/10.1016/j.amepre.2013.05.007

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

Other selected journals from SCIRP are listed as below. Submit your manuscript to us via either submit@scirp.org or Online Submission Portal.