

REVIEW ARTICLE

Is Your Smoke Burning Away Your Home?

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ABSTRACT

Tobacco smoking, a taboo in some parts of the world, has reached its peak and is dancing at the cost of the health of our near and dear ones, leaving the active smoker all alone. If passive smoking continues with the same strength then one day will come when the atmosphere will be layered by the blanket of killer haze. This taboo can only become myth if both the active smoker and passive smoker understand and co-operate with each other.

Key words: Passive Smoking (PS), Active Smoker (AS), Environmental Tobacco Smoke (ETS), Side-stream Smoke (SSS), Main-stream Smoke (MSS), Tobacco, Cigarettes, Smokers.

How to cite this article: Ayushi Gupta, Suraj Singh, Anu Singh, Rahul Srivastava, Ashutosh Shukla. Is Your Smoke Burning Away Your Home?. *International Journal of Contemporary Medical Research* 2015;2(4):1017-1021

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Source of Support: Nil

Conflict of Interest: None

INTRODUCTION

Tobacco smoke is a combination of more than 7,000 chemicals, most of which are directly or indirectly poisonous in nature, for both the active and passive smokers. These harmful substances when absorbed by the various body cells produce deleterious effects. Thus, the poisonous haze increases the risk of developing diseases like cancer of lungs, oral cavity, pharynx, larynx, oesophagus, etc. the severity of risk basically depends on the time of exposure of passive smoker to the poi-

sonous haze, in direct relationship. The active smoker knowingly or unknowingly cause harmful effects to pregnant ladies and their foetus, cardiac patients and patients suffering from various respiratory diseases. The haze so taken in by passive smokers is the harmful combination of smoke exhaled by the active smokers and smoke directly released from smouldering tobacco.^{1,2}

Passive smoking means breathing in other people's tobacco smoke. Second-hand smoke is the common indoor pollutant in the home, making passive smoking a serious health risk for both active and passive smokers.³ Passive smoking (PS) is the inhalation of Second-hand Smoke (SHS) or Environmental Tobacco Smoke (ETS), by individuals other than "Active Smokers (AS)". It is actually the consequence of the smoke envelope formed by the active smokers.⁴

The haze so formed by the tobacco smoke spreads throughout the home, hanging in mid-air rather than dispersing, even if the doors, windows and ventilators are open. Hot smoke rises, but tobacco smoke cools rapidly, which stop its upward climb. Since the smoke is heavier than the air, the smoke starts to descend. Almost 85% of tobacco smoke is invisible and smoke particles might also build up on the surfaces and clothes, although the impact of this is not clear. A person who smokes heavily indoors causes a permanent low-lying smoke cloud that other house-holders have no choice but to breathe.^{3,5}

The intensity of harm caused by the poisonous haze is directly or indirectly related to various factors such as the number of hours of exposure per day, the proximity to the active smoker or smokers, the number of active smokers present in the home, or at the workplace, etc., and the size of the ventilation in the room where the active smokers and passive smokers is/are present.⁶

TYPES OF ENVIRONMENTAL TOBACCO SMOKE

Environmental tobacco smoke consists of 85% side-stream smoke and 15% exhaled main-stream smoke; mixed with the surrounding air. Side stream smoke is the smoke coming from burning ends of the cigarettes and main stream smoke is the smoke which is directly

inhaled from the mouth end of the cigarette by the active smoker.^{5,6}

SIDE STREAM SMOKE V/S MAIN STREAM SMOKE

Side stream smoke is 4 times harmful than main stream smoke. A cigarette burns at higher temperature during inhalation as compared to the temperature when it is burnt, which results in the complete combustion of some toxic components of tobacco, and some of the other tobacco components are filtered during inhalation, which are further filtered during exhalation. Many toxic components, such as 3 times more carbon monoxide, 10-30 times more nitrosamines and approximately 15-30 times more ammonia, are found in higher concentrations in side-stream smoke than in mainstream smoke.^{5,6}

COMPONENTS OF SHS/ETS

More than 7000 chemicals and 50 carcinogens are present in second-hand smoke, made up of particles of gases, which are directly or indirectly injurious to various organs of the body.^{3,6,7}

DIAGNOSIS

A history of the following can suggest environmental tobacco smoke exposure:³

- Recurrent pneumonia
- Asthma
- Bronchitis
- Upper respiratory tract infections
- Otitis media
- Sinusitis

HEALTH HAZARDS

The harmful effects of environmental tobacco smoke can be observed since 1928.¹ Since 1964, 2,500,000 PSs have lost their life because of health problems caused by SHS.⁸ In the 1970s, scientific interest in potential adverse health effects second-hand smoke expanded.¹ Exposure to second-hand smoke causes disease, disability and death, affecting the various systems of the human body. The health risk of side stream smokers are a matter of scientific consensus.⁴

The effect of environmental tobacco smoke on passive smokers depends on the life-style, diet and the immunity status of the individual.⁹

Components found in environmental tobacco smoke

such as ammonia, sulphur and formaldehyde cause offending reactions to the eyes, nose, throat and lungs, triggering or worsening the symptoms if present from before-hand.

The acute effects of passive smoking include decrease in the level of anti-oxidants and vitamins in the blood, decrease in ciliary movement, blood thickening, increase in heart rate at rest, blood pressure, levels of carboxyhaemoglobin in blood, and carbon monoxide. Other effects are increase in the ratio of serum level of total cholesterol to high-density lipoprotein cholesterol, decrease in the serum level of high-density lipoprotein cholesterol, and increase in platelet aggregation, resulting in endothelial cell-wall damage, etc.

Lung Diseases

Passive smoking can increase the risk of lung cancer by a quarter in adults and various respiratory disorders and diseases in children. Environmental tobacco smoke is also associated with increased mucous production (as much as 7 folds), increased movement of airway lumen, increased prevalence of fluid in the middle ear, heart-beat frequency, increased white blood cells production, and increased mucosal permeability to allergens (associated with increased total and specific IgE levels and increased blood eosinophilic counts).

It may also increase the risk of cancers of larynx (voice box) and pharynx (upper throat).⁵ Thus, environmental tobacco smoke has resulted in many life-long non-smoking lung cancer cases.⁴ The compromised lung health includes the symptoms of reduced lung function, increased sputum production, cough and chest discomfort.³

Heart Diseases

The greatest morbidity and mortality related to passive smoking has been attributed to atherosclerotic heart disease in middle and old age.² Nitric oxide acts to inhibit platelet aggregation, the adhesion of monocytes to the arterial wall, the proliferation of smooth muscles, and increased thickness of the intima-media layer of the common carotid artery. The actual mechanism responsible for this arterial damage is not known but may be related to the effects of tobacco smoke on interactions between platelets and the vessel wall or on the oxidation products or lipid components that change with long term exposure to smoke.⁶

David S. et.al. studied 78 healthy subjects (39 male and 39 female) between 15 to 30 years of age and 26 control subjects who had never smoked or had regular exposure to environmental tobacco smoke, 26 who had

never smoked but had been exposed to environmental tobacco smoke for at least one hour daily for three or more years, and 26 active smokers. He thus concluded that passive smoking is associated with dose-related impairment of endothelium-dependent dilatation in healthy young adults, suggesting early arterial damage. Abnormal platelet aggregation is an independent risk factor for coronary heart diseases with the evidence that passive smoking may contribute to atherosclerosis by sensitizing neutrophils, causing their activation and subsequent oxidant-mediated tissue damage.⁷ Endothelial dysfunction is an important early feature of atherogenic process in the systemic arteries of healthy teenagers and young adults as a result of passive smoking.¹⁰ Also, 30 minutes of exposure to PS is enough to reduce coronary blood flow in healthy adults. Thus, a substantial number of coronary events occur, with implications for public health.⁹

JiangHe et.al. searched the Medline and Dissertation Abstracts Online data bases and reviewed citations in relevant articles to identify 18 epidemiologic (10 cohort and 8 case-control) studies that met prestated inclusion criteria. He finally concluded that passive smoking is associated with a small increase in the risk of coronary heart disease. Given the high prevalence of cigarette smoking, the public health consequences of passive smoking with regard to coronary heart disease may be important.

Lipid Profile

Passive smoking may also have adverse effect on lipid profiles. There is increase in low-density lipids which result in cholesterol accumulation, leading to obesity and various coronary heart problems.⁶

Allergic Reactions

Passive smoking may also suffer from the various allergic reactions such as rashes, cough, eye irritations, wheezing in infants etc.

PREGNANCY AND FOETUS

The pregnant women which continue to be active smokers are prone to the increased risk of miscarriage and stillbirth, premature birth and low birth weight, sudden unexpected death in infants which includes sudden infant death syndrome and cot death, and various complications during delivery, etc. In pregnant women, who are active smokers, having a 2-week old foetus, increased lung compliance has been observed in the children after birth, as the poisonous haze results in

various harmful effects on the elastic properties of the foetal lungs.^{3,13}

CHILDREN

Passive smoking is particularly dangerous for children. For children the majority of exposure to passive smoking happens at home. The risk of environmental tobacco smoke to children has inverse relationship to age. Children exposed to passive smoke are at higher risk of respiratory infections (especially lower respiratory tract infections like bronchitis, pneumonia, etc.), asthma, bacterial meningitis, and decreased lung function and slower growth, increased mucous production (phelgm) (as much as 7 folds), cough, increased movement of the airway lumen, glue ear (middle ear infections), sudden infant death syndrome and cot death (the unexplained death of a baby while sleeping).^{3,5} PS kills 6 lakhs a year, including 1.65 lakh children before they turn 5 years of age, says a study by the World Health Organization (WHO), the first of its kind, in 192 countries.

ENCLOSED CHAMBERS

In enclosed chambers or spaces such as cars, small rooms that lack ventilation with closed doors, etc., possess extremely high levels of concentration of environmental tobacco smoke. Especially in cars, specifically during long night journeys where the driver has an urge to smoke so as to remain awake, the intensity of exposure to the environmental tobacco smoke increases by 3 times for children and other passengers, according to the European recommended air pollution standards. But the level greatly varies with the amount of presence of environmental tobacco smoke, fully opened car windows, and/or usage of air conditioner. The peak levels can reach as much as 35 times, according to their recommended levels.⁵

ANALYSIS/EXAMINATION

Biomarkers

The In the above picture there is of a Breath CO monitor displaying carbon monoxide concentration of an exhaled breath sample (in ppm) with corresponding percentage concentration of carboxyhemoglobin.

The biological markers used to assess the various parameters of environmental tobacco smoke include carbon monoxide monitored through breath, nicotine, cotinine, thiocyanates, and proteins, etc. Breath CO monitor displaying carbon monoxide concentration of

an exhaled breath sample (in ppm) with corresponding percent concentration of carboxyhemoglobin (Figure:1). The parameters of the nicotine obtained from active smokers and passive smokers were equivalent, showing similar behavioral changes in both active and passive smokers.



Figure-1: Breath CO monitor apparatus

Carbon monoxide when monitored via breath is the most reliable biomarker of second-hand smoke exposure, tobacco use and patients who are suspected of having CO poisoning. With high sensitivity and specificity, it not only provides an accurate measure, but the test is also non-invasive, highly reproducible, and low in cost.⁴

Blood Cotinine level: The cotinine level of passive smoker can be measured by testing saliva, urine or blood. Cotinine is created when the body breaks down the nicotine found in tobacco smoke.⁸

REDUCING THE RISK OF PS

If the active smoker is unwilling or unable to cease the habit immediately, there are various ways to help protect the health of the people with whom they live.³

Suggestions include:

- There is a misconception that mouth mask can prevent passive smoking.
- Make the use of cigarette restricted to one or two rooms.
- Visitors should not be allowed to smoke indoors.
- Cars and other enclosed places should be made smoke-free.
- Avoid taking children to places prone of active smokers.

SMOKE FREE LAWS

These risk have been a major motivation for smoke-free laws in the workplace and indoor public places, including restaurants, bars and night clubs, as well as

some open places also.¹² From 1st Oct, 2015, it will be an offense to smoke in a vehicle carrying anyone under the age of 18years in England and Wales.⁵

The Supreme Court in *Murli S Deora vs. Union of India and Ors.*, recognized the harmful effects of smoking in public and also the effect on passive smokers, and in the absence of statutory provisions at that time, prohibited smoking in public places such as auditoriums, hospital buildings, health institutions, educational institutions, libraries, court buildings, public office, public conveyances, including the railways.¹⁴

The Act of Parliament of India enacted in 2003 to prohibit advertisement and regulation of tobacco business in India - Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Act, 2003 or COTPA.¹⁵

- A person who advertises tobacco products shall on first conviction shall be punished with up to 2 years in imprisonment or with fine which can extend to Rs. 1000, in case of subsequent conviction shall be punished with up to 5 years in imprisonment or with fine which can extend to Rs. 5000.

CONCLUSION

The deleterious effects of active smoking no alien rules to the individuals who are either active or passive smokers. Knowing the results of environmental tobacco smoke exposure if the active smoker still rest the precious lives of his/her and his/her family members in the hands of the devil named tobacco then it becomes the duty of the passive smokers to motivate the active smokers and convince him to take up proper counseling from any clinician who specialize as in helping active smokers to get rid of this fatal habit. And if there is a wealth of assistance and support of family who wish to stop smoking, then the devil can be completely excluded from their lives.³

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