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Cigarette Smoking & Health Consequences: Review

Dr. Heena Khan, Dr. Nikhil Diwan, Dr. Rashmi Sapkal, Dr. Shraddha S, Dr. Husna Patel

Post Graduate Student, Department of Oral Medicine and Radiology, M.A Rangoonwala College of Dental Science and Research Center, Pune, Maharashtra, India

Professor, Department of Oral Medicine and Radiology, M.A Rangoonwala College of Dental Science and Research Center, Pune, Maharashtra, India

Professor, Department of Oral Medicine and Radiology, M.A Rangoonwala College of Dental Science and Research Center, Pune, Maharashtra, India

Senior lecturer, Department of Oral Medicine and Radiology, M.A Rangoonwala College of Dental Science and Research Center, Pune, Maharashtra, India

Senior lecturer, Department of Oral Medicine and Radiology, M.A Rangoonwala College of Dental Science and Research Center, Pune, Maharashtra, India

ABSTRACT: Tobacco smoking use is the most important preventable health risk in the developed world, and an important cause of premature death worldwide. Smoking causes many diseases, including cancer, Chronic obstructive pulmonary disease, coronary heart disease, stroke, peripheral vascular disease, and peptic ulcer disease. In addition, smoking during pregnancy adversely affects fetal and neonatal growth and development. Globally, smoking-related mortality is set to rise from 3 million annually to 10 million annually by 2030, with 70% of these deaths occurring in developing countries. Many of the adverse health effects of smoking are reversible and smoking cessation treatment represent some of the most cost-effective interventions of all healthcare system. In order to improve smoking cessation rates, effective behavioral and pharmacological treatments, coupled with professional counseling and advice are required. Since smoking quantity and duration are the principal risk factor for smoking-related morbidity, the treatment goal should be early cessation and prevention of relapse.

KEYWORDS: Tobacco smoking, smoking-related morbidity

I. INTRODUCTION

One of the by-products of processed agriculture made from the leaves of Nicotiana plant species is tobacco (1). While smokeless tobacco is ingested by chewing tobacco leaves, smoked tobacco is consumed by smoking cigarettes, cigars, or using a pipe. The effects of tobacco on health are commonly recognized, but in the field of dentistry, tobacco use is recognized to result in poor breath and discoloured teeth that interfere with aesthetics. The components of tobacco products and the burning of tobacco alter the oral cavity, resulting in dry mouth, increased intraoral temperature, altered pH of the oral cavity, altered immunological response, and altered resistance to infection, particularly fungi and viruses(2)(3)(4). Because haemoglobin reacts with carbon monoxide to generate carboxyhemoglobin more quickly than it reacts with oxygen, smoking can impair normal lung function. Smokers, both active and passive, have blood oxygen levels that are 15% below normal as a result of this. Coronary heart disease, coronary artery thrombosis, cancer, and bronchitis are the illnesses that lead to death in smokers(4)(5). This study aims to describe the etiology, health effects, and smoking cessation strategies.

II. CIGARETTE

Cigarettes are made from 4 components (11), each of which is described below

1. Filters
2. Tobacco
3. Additives
4. Cigarette wrapper

1. Filter

Cigarette filters are made specifically to collect and hold smoke particulates and absorb vapors. The majority of cigarette filters—95%—are made of plastic cellulose acetate; the remaining 5% are comprised of paper and rayon. The glue used to affix the plug to the wrapper is polyvinyl acetate emulsion. An additional filtration agent is charcoal.

2. Nicotine and tobacco

Nicotine is the chemical in tobacco that induces addiction in smokers. Cultivated tobacco (*nicotiana tabacum*) is a member of the nightshade family of plants (8).

Nicotine is a potent pesticide and colourless liquid that affects the central nervous system and elevates blood pressure.

3. Ingredients

During manufacture, tobacco may be combined with hundreds of additives. To keep tobacco wet, flavourings and humectants are employed. Tar, which is a sticky yellow-brown material, has a high cancer-causing potential. Coke and strychnine are two of the alkaloids found.

4. Cigarette wrapper & glue

The paper used to wrap the tobacco is made from flax or linen fiber.

III. PATHOPHYSIOLOGY OF SMOKING

Tar, nicotine, and carbon monoxide are the three most hazardous substances in cigarette smoke. Tar, sometimes known as sap tobacco, is a concoction of several hydrocarbons. The main astringent ingredient and major component of cigarette smoke is nicotine. A poisonous gas called carbon monoxide strongly binds to haemoglobin in red blood cells to create carboxyhemoglobin. Additionally, pyridine, ammonia, carbon dioxide, ketones, aldehydes, cadmium, nickel, zinc, and nitrogen oxides are found in cigarette smoke. All substances have varying degrees of ability to irritate the mucous membrane present in the mouth and respiratory tract. Since cigarette smoke has an acidic pH of 5.5, it affects mucous membranes. Because haemoglobin interacts with carbon monoxide to generate carboxyhemoglobin more easily than oxygen, smoking can impair normal lung function. Smokers, both active and passive, have blood oxygen levels that are 15% below normal as a result of this. Smoking either directly causes or exacerbates diseases linked to tobacco. Coronary heart disease, coronary artery thrombosis, cancer, and bronchitis are the illnesses that smokers die from. The benzopyrene and benzanthracene tars in tobacco undergo a partial oxidation during burning; these tar epoxides are DNA-damaging agents, or carcinogens (1).

Since smokeless tobacco does not make these epoxides, oral squamous cell carcinoma is not more common as a result. However, 9% of all cases of squamous cell carcinoma are found in people who have never used tobacco, suggesting that a history of smokeless tobacco use is more coincidental than causal. Traditionally, there are two phases of cigarette smoke: a tar phase and a gas phase. The material that is caught as the smoke stream passes through the Cambridge glass-fiber filter, which retains 99.9% of all. The substance that passes past the filter is the gas phase. Cigarette smoke contains more than 1 1017 free radicals per gram of particulate matter (tar), and more than 1015 free radicals each puff of gas. Compared to the radicals associated with the gas phase, those connected with the tar phase have a longer half-life (hours to months). Mainstream smoke is the cigarette smoke that is inhaled by a smoker while they are actually smoking into the tobacco. The smoke that comes from a cigarette's burning ends is known as side stream smoke. Tar makes up 8% of the overall cigarette smoke, whereas gaseous substances make up 92% of it. The combination of side stream smoke (85%) and a minor portion of mainstream smoke (15%) exhaled by smokers causes environmental tobacco smoke (15)(13)(2). Several defects in reproduction are brought on by maternal cigarette (tobacco) smoking. Low birth weight is the end result of the carbon monoxide in tobacco smoke attaching to haemoglobin and depriving the foetus of oxygen (15).

Other chemicals contained in cigarette smoke, such as nicotine, cadmium, lead, mercury, and polycyclic aromatic hydrocarbons, have been linked to premature births, SIDS, and reduced female fertility. Smoking weakens the immune system, increasing the risk of rheumatoid arthritis and lung infections (15). Additionally, it has an impact on the digestive system, raising the possibility of peptic ulcer disease. In addition, postmenopausal women who smoke are more likely to suffer from reduced bone mineral density and hip fractures (4)(15).

Tobacco smoke that is inhaled travels from the mouth through the upper airway and eventually reaches the alveoli. More soluble gases are absorbed and particles are lodged in the airways and alveoli as the smoke penetrates the respiratory system further. Smokers are at an increased risk of developing malignant and nonmalignant diseases affecting all parts of the respiratory system, including the mouth, due to the high dosages of carcinogens and toxins given to these areas, Smokers are at an increased risk of developing malignant and nonmalignant diseases affecting all

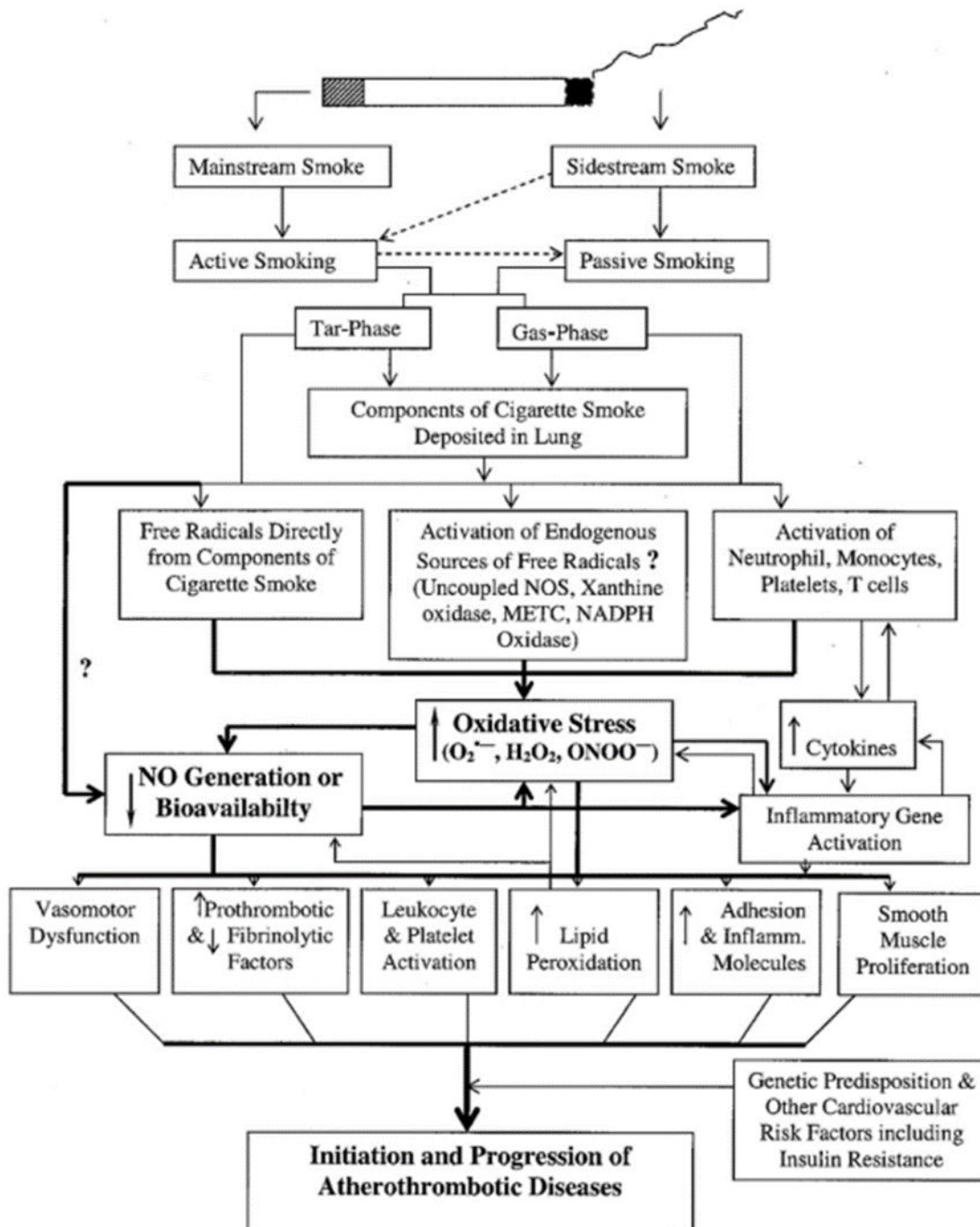


parts of the respiratory system, including the mouth, due to the high dosages of carcinogens and toxins given to these areas. Lung cancer and chronic obstructive pulmonary disease (COPD) are both significantly increased by smoking(13)(3). Lung cancer and chronic obstructive pulmonary disease (COPD) are both significantly increased by smoking(13)(3).

Table: Selected components of cigarette smoke and potential mechanisms of injury (13)

Component	Mechanism
Acrolein	Cilia toxic; impairs lung defences
Formaldehyde	Cilia toxic; irritant
Nitrogen oxides	Oxidant activity
Cadmium	Oxidative injury; promotion of emphysema
Hydrogen cyanide	Oxidative metabolism of cells affected

The claim that cigarette smoking (CS), in both men and women, increases the risk of myocardial infarction (MI) and deadly coronary artery disease (CAD), is backed up by epidemiological studies.



IV.MECHANISM OF ACTION OF NICOTINE

In the brain, spinal cord, neuromuscular junctions, adrenal medulla, and autonomic ganglia, nicotine functions as a ganglionic nicotinic cholinergic agonist. Nicotine has both stimulant and depressive effects, which are dose-dependent pharmacological effects (15). An essential factor in determining susceptibility to nicotine is the alpha 4 subunit. As soon as nicotine enters the body, it quickly spreads throughout the bloodstream and has the ability to pass the blood-brain barrier. When inhaled, the chemical travels to the brain in about seven seconds. In the body, nicotine has a half-life of about two hours. Cytochrome P450 enzymes in the liver break down nicotine. Nicotine, an astringent ingredient, makes up the majority of cigarette smoke (9). The release of many neurotransmitters, including acetylcholine, beta-endorphin,



dopamine, norepinephrine, serotonin, and adrenocorticotrophic hormone (ACTH), mediates nicotine's effects on the central nervous system (CNS) and its peripheral stimulating effects. Peripheral vasoconstriction, raised blood pressure, tachycardia, higher cardiac output, and improved mental clarity and cognitive ability are among the notable stimulant effects of nicotine. Nicotine has depressant effects that include relaxation of the muscles and a reduction in anxiety (9, 15, 4). Nicotine activates the brain's limbic system's "reward" center with increasing doses(15).

Nicotine agonist

It is a kind of anticholinergic medication that prevents acetylcholine from doing its job. In surgery, these substances are mostly employed to paralyze peripheral muscles.

Nicotine agonist

A nicotinic agonist is a drug that mimics the action of Acetylcholine Examples

- 1 lobeline
- 2-epibatidine (9).

Is tobacco Smoking really addictive?

Addiction is marked by the repeated compulsive seeking or use of a substance despite its harmful effects and unwanted consequences. (according to the American cancer society 2014) Nicotine is a drug that occurs naturally in tobacco and its thought to be as addictive as cocaine or heroin (7).

Euphoria:

Nicotine affects mood by flooding the brain's reward circuits with the chemical dopamine when used in modest doses. This creates pleasurable feelings and diverts the user from negative feelings. A typical cigarette contains between one and two milligrams of nicotine. Nicotine withdrawal symptoms appear after quitting smoking(14).

Nicotine withdrawal symptoms

Nicotine replacement treatment or behavioural therapy can be used to relieve withdrawal symptoms caused by quitting nicotine use(7).

Withdrawal Symptoms

Craving for tobacco	3-8 weeks
Recurrent aphthous stomatitis	1-2 weeks
Dizziness	Few days
Insomnia	1-2 weeks
Headaches	1-2 weeks
Constipation	1-2 weeks
Irritability	2-4 weeks
Fatigue	2-4 weeks
Cough	Few weeks
Hunger	Up to several weeks

Methods of cessation of the habit

The World Health Organisation (WHO) advised dentists and other oral health specialists to assist patients in quitting smoking and integrating tobacco cessation into dental procedures(6).

Cessation of the habit

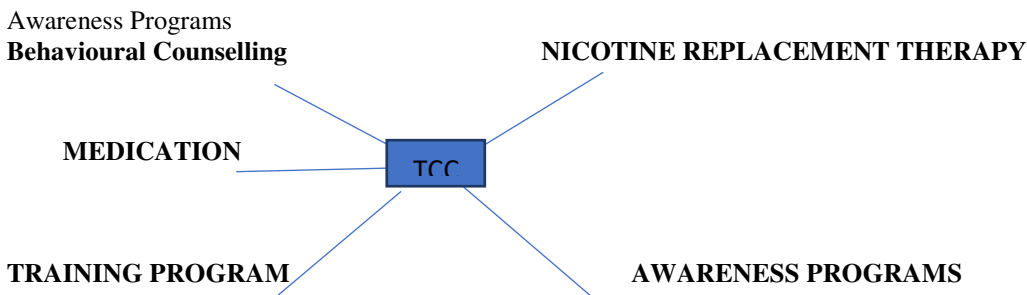
Clinicians can recommend using the 5 A's model to ask, advise, assess, assist, and arrange. The patient's motivation and awareness are of utmost importance in the cessation of the habit (14).

Role of Tobacco Control Cell

The National Tobacco control cell is responsible for overall policy formulation, planning, implementation, monitoring, and evaluation of the different activities envisaged under the National Tobacco Control Program.

Tobacco Control Cell includes the following programs

- Behavioural Counselling
- Medication
- Nicotine replacement therapy
- Training Programs



Nicotine replacement therapy

It masks the withdrawal effects of nicotine. The Food and Drug Administration has suggested and approved the use of nicotine spray and chewing gum to aid in the cessation of smoking (10)(14). The optimum time to begin NRT is right after quitting a habit because it can help with the challenging cravings and withdrawal symptoms.



V.CONCLUSION

Smoking can lead to a number of ailments, thus in addition to professional counselling and assistance, effective behavioural and pharmaceutical treatments are needed to increase the rate at which people give up smoking.

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