

## TOBACCO - THE KILLER CASH CROP

Vishal Anand\* Minkle Gulati\*\* , Bhargavi Anand\*\*\* , Rohit Bahugana †, Amit Kumar††, Bhumika Kamal Badiyani††

\* Reader, Department of Department of Periodontics & Implantologist, Sarjug Dental College & Hospital, Darbhanga, Bihar, India

\*\*Consultant Periodontist, Karnal, Haryana, India

\*\*\* Senior Lecturer, Department of Prosthodontics, Rama Dental College & Hospital, Kanpur, Uttar Pradesh, India

† Reader, Department of Prosthodontics, Uttaranchal Dental College & Hospital, Dehradun, Uttarakhand , India

† † Reader, Department of Public Health Dentistry, Sarjug Dental College & Hospital, Darbhanga, Bihar, India

### ABSTRACT

The peoples of the pre-Columbian Americas first used tobacco. Native Americans apparently cultivated the plant and smoked it in pipes for medicinal and ceremonial purposes. Christopher Columbus brought a few tobacco leaves and seeds with him back to Europe, and diplomats like France's Jean Nicot for whom nicotine is named and began to popularize its use. By 1944, the American Cancer Society began to warn about possible ill effects of tobacco. Today, state laws and legal precedents hold manufacturers more liable for the effects of their products. And the old legal defense of "contributing negligence" -- which prevented lawsuits by people with some measure of responsibility for their own condition -- is no longer viable in most jurisdictions.

**KEYWORDS:** Tobacco; smoked tobacco; smokeless tobacco

### INTRODUCTION

A number of diseases are correlated with food habits, lifestyle and ecological behavior. It is projected that approximately 600 million people chew areca nut, among which a large proportion uses tobacco with it.<sup>1</sup> In the mid-twentieth century smoking in the United States was often associated with romance, relaxation, and adventure; movie stars oozed glamour on screen

while smoking, and movie tough guys were never more masculine than when lighting up. Songs such as "Smoke Gets in Your Eyes" topped the hit parade. Smoking became a rite of passage for many young males and a sign of increasing independence for women. Since the 1990s, however, there has been an increase of opposition to tobacco use. Health authorities warn of the dangers of smoking and chewing tobacco, and nonsmokers object to secondhand smoke - because of both the smell and the health dangers of breathing smoke from other people's cigarettes. Today, a smoker is more likely to ask for permission before lighting up, and the answer is often "no." Because of health concerns, smoking has been banned on airplanes, in hospitals, and in many workplaces, restaurants, and bars.

### PHYSICAL PROPERTIES OF NICOTINE

Tobacco is a plant native to the Western Hemisphere. It contains nicotine, a drug classified as a stimulant, although it has some depressive effects as well. Nicotine is a poisonous alkaloid that is the major psychoactive (mood-altering) ingredient in tobacco. Alkaloids are carbon- and nitrogen-containing compounds that are found in some families of plants. They have both poisonous and medicinal properties. Nicotine's effects on the body are complex. The drug affects the brain and central nervous system as well as

the hypothalamus and pituitary glands of the endocrine (hormone) system. Nicotine easily crosses the blood-brain barrier (a series of capillaries and cells that controls the flow of substances from the blood to the brain), and it accumulates in the brain - faster than caffeine or heroin, but slower than a sedative medicine used to treat anxiety. In the brain nicotine imitates the actions of the hormone epinephrine (adrenaline) and the neurotransmitter acetylcholine, both of which heighten awareness. Nicotine also triggers the release of dopamine, which enhances feelings of pleasure, and endorphins, "the brain's natural opiates," which have a calming effect. As noted earlier, nicotine acts as both a stimulant and a depressant. By stimulating certain nerve cells in the spinal cord, nicotine relaxes the nerves and slows some reactions, such as the knee-jerk reflex. Small amounts of nicotine stimulate some nerve cells, but these cells are depressed by large amounts. In addition, nicotine stimulates the brain cortex (the outer layer of the brain) and affects the functions of the heart and lungs.<sup>2</sup>

## TRENDS IN TOBACCO USE

### Smoked Tobacco

According to the Centers for Disease Control and Prevention (CDC), the consumption of cigarettes, the most widely used tobacco product, has decreased over the past generation among adults. After increasing rather consistently for sixty years, the per capita (per person) consumption of cigarettes peaked in the 1960s at well over four thousand cigarettes per year.<sup>3</sup> The steady decline in smoking came shortly after 1964, when the Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service in January 1964, concluded that cigarette smoking is a cause of lung and laryngeal cancer in men, a probable cause of lung cancer in women, and the most important cause of chronic bronchitis in both genders. By 2006 the annual per capita consumption of cigarettes for those aged eighteen and over was 1,691.<sup>4</sup> According to the NSDUH, 3.2% of those aged twelve and older were current users of smokeless tobacco (chewing tobacco and/or snuff), and 5.6% were current users of cigars. Only 0.9% smoked pipes. These percentages remained relatively constant from 2002 to 2005. According to the U.S. Department of Agriculture, in 2006 the per capita

consumption by males aged eighteen and over was 47.8 large cigars and small, narrow cigars called cigarillos. This figure is much higher than in 1996 when the per capita consumption among this group was 31.9 cigars and cigarillos. The use of snuff has increased as well, although not as much as cigars. In 2006 the per capita consumption of snuff was 0.38 of a pound. In 1996 the per capita consumption of this tobacco product was 0.31 of a pound. Snuff is powdered tobacco that is inhaled through the nose.<sup>5</sup>

### Smokeless form of Tobacco

In India, tobacco is used in a variety of forms such as smoking, chewing, local applications, drinking and gargling, leading to detrimental health effects such as increased incidence of and mortality from cardiovascular diseases, cerebrovascular diseases, respiratory diseases and cancer, in addition to detrimental reproductive outcomes, dental and oral diseases. Tobacco use, in any form, is more popular in lower socio-economic groups. Betel-quid chewing - a mixture of areca nut, slaked lime, catechu, other spices and condiments rapped in a betel leaf - is a popular, socially accepted, ancient custom and the introduction of tobacco reinforced this practice. Chewing products are kept all day and sometimes even all night in the buccal sulcus or pouch; usually in the anterior part of the mouth in populations from North India, and in the posterior part among South Indians, coloring the mouth in red. The introduction of commercial pan masala - dehydrated and non-perishable powdered areca nut, slaked lime, catechu, cardamom and other flavoring and perfuming agents with or without tobacco available in attractive sachets or tins has enhanced the sale and use of smokeless tobacco. Cigarette smoking has always been taboo in India and the emergence of cheap and convenient to carry and use preparations of smokeless tobacco, with a longer shelf-life and promoted with aggressive marketing, has led to a sudden dramatic increase in the habit of chewing tobacco, even among women and children. The carcinogenic effect of betel-quid and pan masala has led to one of the highest incidence and mortality rates of oral cancer with 83,000 incidence cases and 46,000 deaths annually in India.<sup>6</sup> In 1995, a community-based randomized oral cancer screening study to evaluate the efficacy of oral visual inspection in reducing the

deaths from oral cancer was implemented in the Trivandrum district, South India.<sup>7</sup> Enumeration of households, interview and oral cancer screening were carried out through home visits. Incident oral cancers and vital status information were collected through active home visits and through record linkage with the population-based cancer registry or from the government records for death information. Given the fact that tobacco is a major cause of adult morbidity and mortality in India, the battle for tobacco control needs to be continued more strongly through enactment and implementation of legislation and effective community campaigns against tobacco.<sup>8</sup>

### PATHOPHYSIOLOGY

Nicotine exerts its neurophysiologic action principally through the brain's reward center. This neuroanatomic complex, otherwise known as the mesolimbic dopamine system, stretches from the ventral tegmental area to the basal forebrain. The nucleus accumbens, a dopamine-rich area, is an intersection where all addictive behaviors meet. The release of dopamine at this site promotes pleasure and reinforces the associated behaviors, such as the use of alcohol and drugs, to replicate the positive experience. Other factors may also promote nicotine dependence, such as nicotine's reduction in the monoamine oxidase inhibitor enzyme. This enzyme is involved in the metabolism of catecholamines, including dopamine. The net effect would be a lingering presence of the stimulating dopamine at the nucleus accumbens.<sup>9</sup> A closer inspection of nicotine's neurophysiology reveals a much more complex system. In particular, researchers continue to study the brain's neuronal nicotinic acetylcholine receptors (nAChRs). The nAChRs play a central role in nicotine's widespread influence on brain chemistry. Researchers have identified several nAChR subtypes, broadly classified in terms of alpha and beta subunits; the alpha-4 and beta-2 subunits are the most widely expressed in the brain. Acting through the nAChRs, nicotine influences glutamate, gamma-aminobutyric acid (GABA), acetylcholine, dopamine, norepinephrine, and serotonin.<sup>10</sup> Nicotine also releases corticosteroids and endorphins that act on various receptors in the brain. Nicotine use results in more efficient processing of information and reduction of fatigue. In addition, nicotine has a sedative action,

reduces anxiety, and induces euphoria. Nicotine effects are related to absolute blood levels and to the rate of increase in drug concentration at receptors. Nicotine stimulates the hypothalamic-pituitary axis; this, in turn, stimulates the endocrine system. Continually increasing dose levels of nicotine are necessary to maintain the stimulating effects. With regards to dependence, some experts rank nicotine ahead of alcohol, cocaine, and heroin. A teenager who smokes as few as 4 cigarettes might develop a lifelong addiction to nicotine. Small, rapid doses of nicotine produce alertness and arousal, as opposed to long-drawn-out doses, which induce relaxation and sedation. Nicotine has a pronounced effect on the major stress hormones. It stimulates hypothalamic corticotropin-releasing factor (CRF), and it increases levels of endorphins, adrenocorticotropic hormone (ACTH), and arginine vasopressin in a dose-related manner. Corticosteroids also are released in proportion to plasma nicotine concentration. Nicotine alters the bioavailability of dopamine and serotonin and causes a sharp increase in heart rate and blood pressure. It acts on brain reward mechanisms, both indirectly (through endogenous opioid activity) and directly (through dopamine pathways). A cigarette delivers 1.2-2.9 mg of nicotine, and the typical 1 pack-per-day smoker absorbs 20-40 mg of nicotine each day, raising the plasma concentrations to between 23-35 ng/mL. Nicotine addiction results from positive reinforcement (with the administration of nicotine) and withdrawal symptoms that start within a few hours of the last cigarette.<sup>2, 9, 10</sup>

### ADDICTION<sup>4,7,8,10,11</sup>

Nicotine addiction is now referred to as tobacco use disorder in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). There are 11 possible criteria, of which at least 2 must be present in the last 12 months:

1. Tobacco taken in larger amounts or over longer periods of time.
2. Persistent desire or unsuccessful efforts to cut down or control use.
3. A great deal of time is spent on activities necessary to obtain or use tobacco

4. Craving or a strong desire or urge to use tobacco.
5. Recurrent tobacco use resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued tobacco use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by effects of tobacco (eg, arguments with others about tobacco use).
7. Important social, occupational, or recreational activities are given up or reduced because of tobacco use.
8. Recurrent tobacco use in situations in which it is physically hazardous (eg, smoking in bed).
9. Tobacco use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by tobacco.
10. Tolerance, as defined by one of the following:
  - a. The need for markedly increased amounts of tobacco to achieve the desired effect.
  - b. A markedly diminished effect with continued use of the same amount of tobacco.
11. Withdrawal, as manifested by either of the following:
  - a. The characteristic withdrawal syndrome for tobacco.
  - b. Tobacco (or a closely related substance, such as nicotine) is taken to relieve or avoid withdrawal symptoms.

## PATIENT EDUCATION

All patients who smoke should receive education regarding the health effects of smoking. Patients should be provided with a variety of options and a range of advice that will allow them to escape the harmful effects of tobacco use and the addiction to nicotine. Family education should be a primary recommendation every clinician undertakes in an effort to reduce teen smoking. Preliminary results from well-designed randomized controlled studies suggest that family interventions can reduce teen smoking.<sup>12</sup> School-based smoking prevention programs educate students about tobacco use.

Although such programs are widely seen in school curricula, the scientific evidence supporting their utility is limited.<sup>13</sup> Both print and visual media are saturated with antismoking messages. A systematic review of the scientific literature shows that such messages have only a weak impact on smoking rates.<sup>14</sup> Work-based smoking cessation programs that provide both behavioral treatment and medication support can be effective interventions with good quit rates.<sup>15</sup> Naturally, many patients quit smoking on their own. Such patients may be referred to various self-help materials (e.g., books or pamphlets). The evidence that self-help materials lead to smoking cessation when used as the sole treatment strategy is weak.<sup>16-18</sup> Such materials are probably better used as tools to encourage personal education and to facilitate later dialogue between the clinician and the patient. Patients interested in Web-based smoking cessation programs may find many helpful links online too.

## TREATMENT<sup>19</sup>

It is hard to stop smoking or using smokeless tobacco, but anyone can do it. There are many ways to quit smoking. Family members, friends, and co-workers may be supportive. Most people who have quit smoking were unsuccessful at least once in the past. So patients must be encouraged to constantly. A smoking cessation program may improve your chance for success. These programs are offered by hospitals, health departments, community centers, work sites, and national organizations. Nicotine replacement therapy may also be helpful. Research shows that the more times the patient tries, the more likely you are they are to succeed.

## BIBLIOGRAPHY

1. Nelson BS, Heischouer B. Betel nut: a common drug used by naturalized citizens from India, Far East Asia and the South Pacific Islands. *Ann Emerg Med* 1999;34:238-43.
2. Tobacco, Alcohol, Tobacco, and Illicit Drugs. 2008 encyclopedia.com.
3. Smoking and tobacco use. Centers for Disease Control and Prevention [http://www.cdc.gov/tobacco/basic\\_information/index.htm](http://www.cdc.gov/tobacco/basic_information/index.htm)

4. Ferlay J, Bray F, Pisani P, Parkin DM. IARC Cancer Base No. 5. version 2.0 ed. Lyon: IARC Press; 2004. GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide.
5. Sankaranarayanan R, Ramadas K, Thomas G. Effect of screening on oral cancer mortality in Kerala, India: a cluster randomised controlled trial. *Lancet* 2005;365:1927-33.
6. Sankaranarayanan R, Mathew B, Jacob BJ. Early findings from a community-based, cluster-randomized, controlled oral cancer screening trial in Kerala, India. *Cancer* 2000;88:664-73.
7. Glassman AH, Koob GF. Neuropharmacology. Psychoactive smoke. *Nature*. 1996;379(6567):677-8.
8. Picciotto MR, Brunzell DH, Caldarone BJ. Effect of nicotine and nicotinic receptors on anxiety and depression. *Neuroreport* 2002;13(9):1097-106.
9. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. 5th ed. Arlington, VA: American Psychiatric Association; 2013. 571-4.
10. Thomas RE, Baker P, Lorenzetti D. Family-based programmes for preventing smoking by children and adolescents. *Cochrane Database Syst Rev* 2007;CD004493.
11. Thomas R, Perera R. School-based programmes for preventing smoking. *Cochrane Database Syst Rev* 2006;CD001293.
12. Sowden AJ, Arblaster L. Mass media interventions for preventing smoking in young people. *Cochrane Database Syst Rev* 2000;CD001006.
13. Cahill K, Moher M, Lancaster T. Workplace interventions for smoking cessation. *Cochrane Database Syst Rev* 2008;CD003440.
14. Lancaster T, Stead LF. Self-help interventions for smoking cessation. *Cochrane Database Syst Rev* 2005;CD001118.
15. Partnership for a tobacco free maine [http://www.tobaccofreemaine.org/quit\\_tobacco/](http://www.tobaccofreemaine.org/quit_tobacco/)
16. Tobacco Addiction, Smokeless Tobacco: Tips on how to stop <http://familydoctor.org/familydoctor/en/diseases-conditions/tobacco-addiction/treatment/smokeless-tobacco-tips-on-how-to-stop.html>)
17. Benowitz NL, Brunetta PG. Smoking hazards and cessation. In: Broaddus VC, Mason RJ, Ernst JD, eds. Murray and Nadel's Textbook of Respiratory Medicine. 6th ed. Philadelphia, PA: Elsevier Saunders; 2016:chap 46.
18. Rakel RE, Houston T. Nicotine addiction. In: Rakel RE, Rakel DP, eds. Textbook of Family Medicine. 9th ed. Philadelphia, PA: Elsevier Saunders; 2016:chap 49.
19. U.S. Preventive Services Task Force. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.S. Preventive Services Task Force reaffirmation recommendation statement. *Ann Intern Med* 2015. doi: 10.7326/M15-2023. PMID: 26389730 [www.ncbi.nlm.nih.gov/pubmed/26389730](http://www.ncbi.nlm.nih.gov/pubmed/26389730).)

#### CONFLICT OF INTEREST & SOURCE OF FUNDING

The author declares that there is no source of funding and there is no conflict of interest among all authors.

