

Review Article

Tobacco: The Menace of a Deadly Epidemic and Strategies for its Cessation

Dr. Amit Kumar Shrivastav¹, Dr. Aabha², Dr. Ankit Mishra³

¹BDS (Panjab University, Chandigarh), Scientist B (Medical), ICMR Project, Neonatal Unit, PGIMER, Chandigarh;

²Tobacco Intervention Initiative Consultant (2017-2018), MDS (Final Year), Department of conservative Dentistry & Endodontics, Dr. Harvansh Singh Judge Institute of Dental Sciences & Hospital Panjab University, Chandigarh;

³BDS (Panjab University, Chandigarh)

ABSTRACT:

Background: Tobacco abuse is the leading but preventable cause of death in the world with approximate 7 million people dying every year. Several non-communicable diseases are associated with tobacco use, such as coronary heart disease, diabetes, cancer, and chronic respiratory illnesses. In India more deaths related to tobacco are due to oral cancer than lung cancer as seen worldwide. **Objective:** the objective of this review article is to describe the types of tobacco products available commercially, the expanse of tobacco abuse in the world and in India, the means of tobacco cessation and finally the importance of the role of a dentist in tobacco cessation. **Conclusion:** Tobacco abuse is a pandemic and is a culprit to millions of preventable deaths every year and the role of dentists in tobacco cessation is pivotal.

Keywords: Tobacco abuse, addiction, Cessation & Intervention.

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Corresponding Author: Dr. Dr. Amit Kumar Shrivastav, BDS (Panjab University, Chandigarh), Scientist B (Medical), ICMR Project, Neonatal Unit, PGIMER, Chandigarh

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I. INTRODUCTION

Tobacco is the common name used for the plant belonging to the genus *Nicotiana*. There are more than sixty species belonging to this genus, of which *Nicotiana tabacum* is used for commercial tobacco production. The other major species belonging to the genus is *Nicotiana rustica*. *Nicotina tabacum* has its origin from South America while *Nicotiana rustica* has origin from North America.^[1]

The cured leaves of the plant are used in numerous ways, like for extraction of nicotine, snuffing, chewing and smoking^[2] and Columbus, in 1492 discovered that the native Americans grow and use tobacco not only for religious purposes^[3] or its pleasurable effect but also for treating various illnesses^[1] such as asthma, earaches, GIT disturbances, fever, sore eyes, insect stings, burns and depression etc^[3]. Nino and Guerra in 1500 discovered that People used tobacco for disinfection, as

anesthetic agent and in tooth paste when mixed with chalk lime. This is still in practice in India where tobacco based toothpastes are marketed commercially.^[1]

In the late fifteenth century, tobacco was introduced in Europe, in the countries of Spain and Portugal.^[1] Subsequently Portugues and Spanish sailors helped to spread the use of tobacco around the world. The main tobacco growing and consuming countries are China, USA, former Soviet nation, India and Brazil.^[3]

Tobacco abuse is the world leading but preventable cause of death with approximate 7 million people dying every year. Non-communicable diseases are associated with tobacco use, such as coronary heart disease, diabetes, cancer, and chronic respiratory illnesses. These are the top causes of death worldwide.^[4]

Without intervention, tobacco-caused deaths will reach 8.3 million in 2030.^[3] About 80% of the users reside in low to middle-income nations.^[5]

According to the Global Adult Tobacco Survey second round (2016-2017) India is the home to 267 million tobacco abuser, and has the second largest number of tobacco abusers globally. In India 42.4% men and 14.2% women use tobacco.^[5] Most vulnerable age group is that of the adolescents with gender predilection towards the males^[4]. India is the third largest producer of the tobacco therefore facing significant tobacco associated mortality and morbidity burden. Out of 1.3 million, one million are smokers and rest use smokeless tobacco. The striking feature of tobacco associated mortality in India is that it is more due to oral cancer than lung cancer. Half of all the oral cancers in the world are in India.^[5]

II. FORMS OF TOBACCO

Tobacco is used as *smoked* and *smokeless* forms.^[6, 7]

A. Smoked form:

1. Hukka (water pipe)
2. Chilam (Clay pipe)
3. Cigarettes: Most common in the World
4. Bidis: Most common in India
5. Cigars
6. Hookahs
7. Shisha
8. Chchuta (Reverse smoking)
9. Kreteks (Clove cigarettes)

B. Smokeless tobacco:

Can chewed, sniffed and sucked on

1. Chewable Tobacco
2. E-Cigarette
3. Snuff
4. Snus
5. Dissolvable Tobacco
6. Mawa
7. Qiwam
8. Gutkha
9. Kheni (mixture of dry raw tobacco with lime) – most commonly used form in India
10. Zarda
11. Betel quid with tobacco,
12. Paan-masala

III. DANGEROUS COMPONENTS OF TOBACCO

1. Nicotine: Poisonous substance leading to addiction and behavioral effects
2. Carbon Monoxide: reduces oxygen delivery by blood and causes dyspnea.
3. Tar: contains benzopyrene, which is highly carcinogenic.^[8]
4. Others: Compound like volatile sulfur containing compounds, volatile nitrosamines, nitrogen oxides, carbon dioxide, ammonia, and hydrogen cyanide, volatile hydrocarbons, ketones, aldehyde and alcohols.

IV. CONSEQUENCES OF TOBACCO USE

A. Economic loss: The daily expenditure on tobacco consumption, treatment of caused illnesses put burden on the individual and family.

B. Health loss:

1. Cancers associated with tobacco:

Nasal, respiratory tract and lungs, upper GI Tract and oral, liver, Pancreas, urinary bladder, kidney and cervix etc. Smokeless forms are the main cause of oral cancer. *Increased frequency, duration and degree of inhalation are major contributing factor in development of cancers.*

2. Cardiovascular diseases

Stroke and coronary artery diseases (smoking acts synergism with high LDL and hypertension to increase the risk).

3. Respiratory Diseases

Chronic Obstructive Pulmonary Disease (chronic bronchitis and pulmonary emphysema), Tuberculosis and Asthma.

4. Effect on pregnancy and its outcome

Ectopic pregnancy, abnormalities of the placenta, miscarriage/abortion, premature delivery of baby, bleeding during pregnancy and stillbirth

5. Effects on newborns and childhood

Maternal smoking or exposure to second hand smoke is associated with congenital defects like orofacial clefts, clubfoot and atrial-septal defects.

6. Miscellaneous

It worsens conditions like Rheumatoid arthritis, Age-Related Macular Degeneration, Dental caries, periodontal problems, Diabetes, Inflammatory bowel diseases and Erectile dysfunction.

C. Environmental loss: Forests are destroyed for cultivation of tobacco. Burning tobacco releases toxicants in the environment. Industrial production and transportation of tobacco products cause environmental pollution.^[8]

V. NICOTINE ADDICTION:

Nicotine from both smoked and smokeless forms enters the arterial circulation and gets quickly transferred to the brain causing the release of neurotransmitters, one of them being Dopamine.

Signaling of pleasurable experiences by dopamine is essential for reinforcing effect, promoting self-administration. The dopamine sensitive neurons present in the ventral tegmental area and in nucleus accumbens

of the human brain are important in drug-induced reward. Inhibition of enzymes monoamine oxidase type A and B, by condensation products of the compound acetaldehyde present in cigarette smoke lead to decrease in dopamine metabolism contributing to tobacco addiction.^[7]

Nicotine works in synergism with alcohol. Alcohol is depressant while nicotine is stimulant; therefore one does not realize how much the alcohol is affecting their body. This leads to excessive drinking due to poor judgment. Their simultaneous use affects metabolism of both the drugs thus increasing the time that carcinogens from cigarette stay in the blood.^[10]

Clinical significance of Nicotine Addiction:

Nicotine causes pleasure and lower stress and anxiety thereby controlling mood.

It increases concentration and performance of the individual. This may be due to relief from withdrawal symptoms such as irritability, mood disturbances, loss of interest in life and Anhedonia (the feeling that there is little pleasure in life)^[9]. Tobacco contains nicotine which stimulates the dopamine; after the dopamine wears off, withdrawal symptoms like cough, chest tightness, sore throat, sore tongue and gums, flu-like aches and discomfort, Irritability, sleep problems, fatigue, difficulty concentrating, headaches appear leading to cravings.^[11]

Combination of positive reinforcements, mood enhancement and the avoidance of withdrawal symptoms forms the basis of nicotine addiction. Here conditioning also plays a role. The abuser typically consumes tobacco product post meals, with a beverage, alcoholic with an alcoholic drink or with, family friends and colleagues. When repeated a number of times, such situations act as a cue to use of tobacco. Other cues can be the taste smell, feel of smoke in the mouth and site of another smoker and relief from unpleasant mood and irritability.^[7]

VI. WHY IS IT DIFFICULT TO QUIT TOBACCO USE?

A. External barriers

1. Social impediments: shame or judgment for not being able to quit, peers encouraging to smoke, site or physical presence of other smokers providing an inconducive environment for quitting
2. Non compliance to nicotine replacement therapy or addiction to it.
3. Several failed attempts^[11]

B. Internal barriers

1. Lack of awareness: smoking out of habit.

2. Avoidance: to avoid unpleasant feelings and thoughts, including urges and withdrawal symptoms.
3. Maladaptive beliefs: the abuser perceives tobacco consumption as a part of their identity.
4. Ambivalence: mixed feelings about quitting, lack of strong desire to quit.
5. Benefits of smoking: the false belief that it adds value to the personality or are a "constant" in life.

It has also been found that genetics play a role in many aspects of smoking, like the urge to start smoking, or continuing to become a "smoker" etc.

VII. THERAPY FOR TOBACCO CESSATION

Therapy for tobacco-cessation can be broadly categorized as:

A. Pharmacological:

1. Nicotine Replacement Therapy: These therapies supply nicotine to the nicotinic receptors of the central nervous system (CNS) in much lower doses and at a significantly slow rate than tobacco products. They enhance tobacco cessation rates by 50-70% and, also help in decreasing weight gain associated with it. Used as mono-therapy, a rapid-onset NRT for example gums (most common form), lozenges, nasal sprays, or oral inhalers should be taken regularly to avoid withdrawal symptoms. Combination NRT with nicotine patch is comparatively more effective than mono-therapy.^[8]

a. Transdermal patches : they require 6-8 hours to reach peak serum level.^[9]

b. Oral : Nicotine from gum, lozenges, sub-lingual tablet or oral inhaler is absorbed via the buccal mucosa. Serum peak levels of nicotine are achieved in 20-60 minutes.^[9]

c. Nasal Spray: it is the fastest-acting of all NRTs which is still much slower than cigarettes. It achieves a peak nicotine CNS level in 5-20 minutes. Due to irritation of the throat and nasal mucosa, it should not be used for over three months.^[9]

2. Non- Nicotine therapy

BUPROPION: It is an anti depressant agent having some nicotinic-receptor-inhibiting activity. A sustained-release (SR) formulation (zyban) is FDA-approved and should be started 7-14 days before the target quit date to allow for adequate steady-state serum concentrations. It is shown to be equally effective as NRT in increasing tobacco cessation rates and reducing weight gain. But it is not effective in quitting smokeless tobacco.^[9]

VARENICLINE — Varenicline tartrate (*Chantix*), is a nicotinic receptor partial agonist, which is FDA-approved for tobacco cessation. It selectively acts on $\alpha_4\beta_2$ nicotinic acetylcholine receptors, thereby relieving cravings while quitting tobacco. It also binds to this receptor with greater affinity when compared to nicotine, decreasing the reward of smoking. Like Bupropion it should be started 7 days before the target date for adequate steady state serum levels. Varenicline has limited value in smokeless tobacco cessation.^[9]

B. Behavioural treatment

1. Psycho-Education: it helps the patient to accept the treatment methods.
2. Aversion therapy: Create aversion towards tobacco use by distaste, disgust, fear, or displeasure. Such reactions reduce the incentive to smoke.
3. Social support: Spouses and the relatives of the client are also included in tobacco cessation program to teach them to be supportive of individual's quitting program.^[8]

VIII. ROLE OF DENTAL HEALTH PROFESSIONAL IN TOBACCO CESSATION

Dentists are the first line of defense in early detection of tobacco related diseases. Counseling by dentist helps the patient understand the deleterious effects of continued tobacco usage. This can be done at a personal basis or as a formal TCC (Tobacco cessation centre). A TCC is certified dental clinic where the dentist offers counseling at individual or group level, behavior therapy, self-help materials, educational CDS and books along with Nicotine Replacement Therapies (NRT).

IX. GLOBAL INITIATIVES FOR TOBACCO CESSATION:

A. Center for Global Tobacco Control (CGTC): Main three aims are:

1. To help the partner countries in preventing its youth from smoking, protecting non-smokers from the harm of the adult second-hand smoke, and create conducive social environment to quit more easily.
2. Enforced to World Health Organization's Framework Convention for Tobacco Control, including policies on raising price by increasing taxes, comprehensive bans on smoking and policies for smoke-free schools for children^[10], Framework Convention on Tobacco Control (FCTC, 2004) the first international health treaty provides guidance for cessation assistance at the national level. The FCTC recommends cessation support and treatment of tobacco dependence as key components of a comprehensive, integrated tobacco control program. In particular, the FCTC guidelines call for development of national

strategies for evidence-based clinical treatments that are free of conflicts of interest with "commercial and other vested interests of the tobacco industry".^[12]

3. Educate the people about the risk and dangers of tobacco use through mass media, pictorial warnings on tobacco product packages, and policies that stop tobacco industry's efforts to market tobacco to children.^[7]

X. TOBACCO CESSATION PROGRAMME IN INDIA

The government enacted the Cigarettes and Other Tobacco Products Act in 2003. The act applies to all tobacco containing products such as cigarettes, cigars, bidis, *gutka*, *pan masala*, *khaini*, snuff etc. The act has following features:

The act has Banned Smoking in all the public places. The act also prohibits advertisement, promotions and sponsorships of all of the tobacco products; in every form of multi-channel media such as audio, visual and print. It has imposed a total ban on the sponsoring of any public events such as sports or cultural activities by cigarette and other tobacco containing products producing companies.

Tobacco sale to the minor people i.e. under the age of 18 years has also been prohibited by the act. Furthermore prohibition on the sale of tobacco and its product near and educational institute within a radius of hundred yards has also been imposed by the act.

Specific health warning on packaging of tobacco products are used as made compulsory by the act. Also each tobacco packaging is required to have total nicotine and tar content present in it along with their highest permissible limits.^[8]

XI. TOBACCO FREE INITIATIVE IN INDIA

During the year 2001-02, Tobacco Cessation Centres (13 in number) were established in 12 states throughout India. This includes NGOs, psychiatric hospitals, medical colleges, and hospitals offering cancer treatment etc.^[13]

National Guidelines for Tobacco Dependence have been devised and disseminated by the Government in the year 2011. This facilitates the proper training of health care professionals in cessation of tobacco use. Many interventions and research studies were also supported so as to develop a community based tobacco cessation model.^[12]

A. To Make India Tobacco free by 2022.

Mission: Tobacco Free India / Healthy India

Aims:

- Making tobacco intervention accessible to all by establishing a chain of TC Centres.

- Creating awareness and knowledge dissemination.
- Fostering commitment to tobacco cessation by training dental professionals.
- Creating a workforce of talented and skilled professionals.
- Developing multi-disciplinary approach in scientific and research related activities for tobacco intervention.
- Promoting timely transfer of research knowledge and its health implications to the public, dental professionals and policy-makers.^[13]

XII. CONCLUSION

Tobacco abuse and consequent nicotine addiction is a global epidemic. It annually kills billions and billions are spent to control its abuse. No matter how difficult it is to quit its use, perseverance at the end of the user and their counselor is the key to success. Today it is an increasingly cost-conscious health care environment, which leads to efforts in developing collaborative initiatives which can use or enhance the already existing resources so that an effective evidence based care is delivered to the society.

XII. TOBACCO HELPLINE NUMBER

The National Tobacco Cessation **QuitLine-1800 227787** is a dedicated toll-free number that helps tobacco users to receive free support and guidance to subdue their addiction.

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REFERENCES:

1. Charlton A. Medicinal uses of tobacco in history. *Journal of the royal society of medicine.* 2004 Jun;97(6):292-6
2. Johnson BE. Tobacco and lung cancer. *Primary Care: Clinics in Office Practice.* 1998 Jun 1;25(2):279-91
3. Mishra S, Mishra MB. Tobacco: Its historical, cultural, oral, and periodontal health association. *Journal of International Society of Preventive & Community Dentistry.* 2013 Jan;3(1):12
4. Dale LC, Ebbert JO, Glover ED, Croghan IT, Schroeder DR, Severson HH, Hurt RD. Bupropion SR for the treatment of smokeless tobacco use. *Drug and alcohol dependence.* 2007 Sep 6;90(1):56-63.
5. World Health Organization. GLOBAL ADULT TOBACCO SURVEY: Second Round..
6. Shah S, Dave B, Shah R, Mehta TR, Dave R. Socioeconomic and cultural impact of tobacco in India. *Journal of family medicine and primary care.* 2018 Nov;7(6):1173.
7. World Health Organization. WHO framework convention on tobacco control. WHO Regional Office for South-East Asia; 2004.
8. https://www.nhp.gov.in/effects-of-tobacco-on-health_pg
9. Benowitz NL. Nicotine addiction. *New England Journal of Medicine.* 2010 Jun 17;362(24):2295-303
10. <https://www.alcohol.org/mixing-with/tobacco/>
11. Heffner JL, Watson NL, McClure JB, Anthenelli RM, Hohl S, Bricker JB. "I Smoke Like This to Suppress These Issues That Are Flaws of My Character": Challenges and Facilitators of Cessation Among Smokers With Bipolar Disorder. *Journal of dual diagnosis.* 2018 Jan 2;14(1):32-9
12. Novotny TE, van Schalkwyk MC. How Should Physicians in Low-and Middle-Income Countries Regard Electronic Nicotine Delivery Systems to Facilitate Smoking Cessation?. *AMA Journal of Ethics.* 2020 Feb 1;22(2):82-92
13. Patil AP, Patil M, Karikatti S, Halki S. Tobacco Use, Its Correlates and Knowledge about Its Hazards in Belgaum Urban, Karnataka. *Hindu.*;227:95-37.
14. Basu S, Glantz S, Bitton A, Millett C. The effect of tobacco control measures during a period of rising cardiovascular disease risk in India: a mathematical model of myocardial infarction and stroke. *PLoS medicine.* 2013 Jul;10(7).