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Tobacco Use Cessation and Prevention – A Review

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ABSTRACT

Tobacco use is a major preventable cause of premature death and disease, currently leading to over five million deaths each year worldwide. Smoking or chewing tobacco can seriously affect general, as well as oral health. Oral health professionals play an important role in promoting tobacco free-lifestyles. They should counsel their patients not to smoke; and reinforce the anti-tobacco message and refer the patients to smoking cessation services. Dentists are in a unique position to educate and motivate patients concerning the hazards of tobacco to their oral and systemic health, and to provide intervention programs as a part of routine patient care. Tobacco cessation is necessary to reduce morbidity and mortality related to tobacco use. Strategies for tobacco cessation involves 5 A's and 5 R's approach, quit lines and pharmacotherapy. Additionally, tobacco cessation programs should be conducted at community, state and national levels. Various policies should be employed for better tobacco control. Governments should implement the tobacco control measures to reduce the prevalence of tobacco use and exposure to tobacco smoke. In addition, there should be availability of leaflets, brochures, continuing patient education materials regarding tobacco cessation.

Keywords: Dental professionals, Behaviour interventions, Health consequences, Health professionals, Nicotine, Policies, Smoking,

INTRODUCTION

Tobacco was introduced to the world by Christopher Columbus, who discovered tobacco among the treasures of the New World in 1492 [1]. It is derived from the species of the plant of genus *Nicotiana* of the potato family. Carl Linnaeus in 1753 named the genus of the tobacco plant "*Nicotiana*" after the French Ambassador to Portugal, Jean Nicot [2].

The history of tobacco use traces back to the dawn of human civilization and has been deeply entrenched into the human society since time immemorial [3]. In India, tobacco was introduced by Portuguese and British promoted cigarettes to establish tobacco industry in the country [1]. In the 1800's and early 1900's, snuff was used for medical ailments to relieve toothaches, scurvy, and even neuralgia [4]. Historically, it was one of the most common forms of tobacco consumed, until recently when it was overtaken by cigarettes in the early 20th century [3].

Tobacco use is a major preventable cause of premature death and disease, currently leading to over five million deaths each year worldwide [5]. Variations in tobacco smoking prevalence have also been reported according to race, ethnicity and education level [6]. Despite, the knowledge and the concerted preventative efforts at both national and state level tobacco still threatens the health and well being of many individuals and those individuals exposed to a smoking environment.

Smoking or chewing tobacco can seriously affect oral, as well as general health and tobacco consumption is one of the main causes of oral cancer, a serious and growing worldwide problem [7].

FORMS OF TOBACCO [2, 5, 8-10]

Smoking tobacco products include bidis, manufactured and hand-rolled cigarettes, pipes, cigars, hookah, water pipes, sticks and other locally produced smoking tobacco products, e.g., chuttas, dhumti, chillum and kreteks, etc.

Smokeless tobacco products or spit tobacco include chewing tobacco products such as betel quid with tobacco, khaini, gutkha, paan masala, mainpuri tobacco and other products like mishri, mawa, gul, bajjar, gudakhu, snuff, etc., [5].

TOBACCO USE

Global Scenario: According to World Health Organization (WHO), there are about 1100 million regular smokers in the world

today. Globally, tobacco is responsible for the death of 1 in 10 adults (about 5 million deaths each year) with 2.41 million deaths in developing countries and 2.43 million deaths in developed countries [3]. Also, around one-third of the adults are estimated to be regularly exposed to second-hand tobacco smoke [11].

Indian Scenario: India is world's third largest tobacco growing country and second largest consumer of tobacco products in the world [1]. India accounts highest tobacco-related mortality with about 7,00,000 annual deaths attributable to smoking in the last ten years, with an expected rise to one million in the coming decade [12].

More than one-third (35%) of adults in India use tobacco in some form, 21% of adults use smokeless tobacco, 9% only smoke tobacco and 5% smoke as well as use smokeless tobacco [5]. It is estimated that annual oral cancer incidence among Indian males is as high as 10 per 100,000 [13].

Second Hand Smoke [14]

Also called environmental tobacco smoke, involuntary smoking, and passive smoking. It is a complex mixture of chemical constituents and particulates released into the atmosphere from the burning tip of a cigarette, pipe or cigar including the smoke exhaled by the smoker. Globally, it is estimated that about one third of adults and an estimated 700 million children worldwide – are exposed to second-hand tobacco smoke at home [11].

Third Hand Smoke: It is referred to the toxic chemicals built up for weeks and months from second hand smoke like coating the surfaces of room and smokers' belongings [11].

HEALTH CONSEQUENCES

General Health: Tobacco use has been regarded as a potential risk factor for chronic conditions like cancer, cardiovascular and pulmonary diseases, with serious deleterious effects [8]. A study conducted by Doll et al., reported that cancer of the lung, chronic obstructive lung disease and cardiovascular diseases are all strongly associated with cigarette smoking [15]. Newer research findings indicate that smoking is a major risk factor for tuberculosis in India [16].

Smoking during pregnancy increases the chance of low-birth-weight baby, miscarriage, premature birth, Sudden Infant Death Syndrome (SIDS) [9]. Also usage of tobacco can induce oxidative damage, increased inflammation, increased levels of inflammatory markers, cataracts and age-related macular degeneration [17].

Oral Health: Oral cavity is the first to be exposed to tobacco smoke which may cause tooth stains, abrasions, smoker's melanosis, Acute Necrotizing Ulcerative Gingivitis (ANUG), nicotinic stomatitis, keratotic patches, black hairy tongue, palatal erosions and oral carcinoma. However, smokeless tobacco can induce oral keratosis and gingival recession [18].

Smoking during pregnancy has six times greater chance of cleft palate formation [8]. Recently maternal tobacco use has been related to primary caries development in their children [19]. Tobacco suppresses the immune system's response to oral infections [8]. Additionally, tobacco use increase and complicates treatment risks by compromising the prognosis for periodontal and other oral diseases and increasing the likelihood of the occurrence and reoccurrence of mouth cancers [20].

Tobacco Dependence: The International Classification of Diseases (ICD-10) has recognized that "tobacco dependence" is a disease. Tobacco Dependence is defined as, "Cluster of behavioral, cognitive and physiological phenomena that develop after repeated tobacco use and that typically include a strong desire to use tobacco, difficulties in controlling its use, persistence in tobacco use despite harmful consequences, a higher priority given to tobacco use than other activities and obligations, increased tolerance and sometimes a physical withdrawal state" [21]. Nicotine is readily absorbable from the respiratory tract, buccal mucosa and skin [21].

Nicotine dependence produces symptoms related to CNS like irritability, anger, impatience, difficulty in concentrating, where craving plays an important role and may lead to relapses in smokers trying to quit [22].

ROLE OF DENTAL PROFESSIONALS

In 1996, the World Dental Federation (FDI) established the Section on World Dentistry against tobacco and adopted the FDI position statement on tobacco [23]. Dental professionals can detect harmful effects of tobacco use which can be clinically apparent in the oral cavity quite in the early stages of use [24].

Dentists can influence children and youth to adopt a tobacco-free lifestyle. Treat women of childbearing age and can inform them of the dangers of tobacco use during pregnancy. A study conducted by Brothwell DJ showed that oral health professionals are effective at increasing the number of patients who successfully quit smoking [25]. The Oral Health Network of Tobacco Use Prevention and Cessation (OHNTPC), established with the first European Workshop in 2005, facilitate the ongoing support and future collaborations among all oral health professionals [26].

TOBACCO CESSATION

Tobacco cessation is essential to reduce the mortality and morbidity related to tobacco use. Presently, India has about 18 Tobacco Cessation Clinics (TCCs) across the country. This clearly is an inadequate effort taking the existing 250 million tobacco consuming population into consideration [3].

Tobacco cessation methods can be broadly classified into [11]:

- Cognitive Behavioral Therapy (CBT) includes methods such as self-help and brief interventions which can be provided by health professionals.
- Intensive therapy at smoking cessation centers.
- The pharmacological means including Nicotine Replacement Therapy (NRT) and antidepressants like bupropion.

Behavior Interventions [22]

A variety of behavior therapies, ranging in complexity from simple advice offered by a physician or other health care provider or much more extensive therapy offered by counselors, have been shown to be efficacious for tobacco cessation.

One of the most effective non-pharmacological interventions for smokers strongly motivated to quit is by providing behavior support beyond scheduled clinical care by appropriately trained counselors.

Strategies for Tobacco Cessation – Clinical Practice Guidelines: The 5 "A's" and 5 "R's" [32]: The five A's: Ask, Advise, Assess, Assist and Arrange and five R's: Relevance, Risk, Rewards, Repetition, Roadblocks is a five to fifteen minute approach that has proven global success.

Quit lines [27]

These telephone based programs have shown a higher degree of smoking abstinence of around 30 to 50 percent than normally achieved.

Pharmacotherapy [6]

Three types of available pharmacological interventions for smoking cessation have been demonstrated with behavioral support.

First Line of Drugs

- Nicotine Replacement Therapy
- Bupropion
- Varenicline

Second Line of Drugs

- Nortryptiline
- Clonidine

Nicotine Replacement Therapy

- Aims to alleviate nicotine withdrawal symptoms and to reduce smoker's desire to smoke.
- A variety of products are available. They are: Nicotine Gum, Nicotine Patch, nasal Sprays, Nasal Inhaler, Nicotine Sublingual Tablets and Lozenges and Nicotine Vaccine. These products have a shorter duration of action, in which blood-nicotine levels reach a peak within 20 minutes [28-31].

Nicotine Gum

- Available since 1984 [32]. Contains either 2mg or 4 mg of nicotine in an ion resin base "polacrilex" that is buffered in an alkaline pH to optimize buccal absorption [33].
- Roughly, 25% of the released nicotine is swallowed and then metabolized.
- Thus, the systemic dose of nicotine using the 4mg gum is much inferior that obtained from smoking [20, 33].
- Use of nicotine gum increases cessation rates by 50% to 70% [34].

Nicotine Patch [35-39].

- Available since 1991. Transdermal patches are designed to release nicotine slowly and steadily.
- As soon as the patch is applied, transfer of nicotine takes place until constant state is attained with nicotine presence in the patch, skin "reservoir", and in circulation.
- Increases cessation rates by approximately 1.5 to 2 times compared with placebo when used alone.

Nasal Sprays [40-42]

- Fastest delivery and the highest nicotine levels among all nicotine replacements products. And roughly doubles the long-term cessation.
- Easy spray delivers 0.5 mg nicotine, and a single dose (1mg) consists of a spray in each nostril. Absorption occurs through nasal mucosa, and peak plasma nicotine concentrations are reached within 10-15 minutes.
- 1-2 doses per hour should be given and then titrate the dose per individual requirement up to a maximum of 40mg per day.

Nicotine Inhaler [43-45]

- Released in 1998, it is more a "puffer" than an inhaler, composed of a plastic tube that contains a nicotine cartridge.
- The cartridge provides a 4mg of nicotine vapor from a porous plug that is then absorbed from the mouth.
- Twice the continuous abstinence rates have been demonstrated with nicotine inhalers.

Nicotine Sublingual Tablets and Lozenges [36, 37, 46, 47]

- Newer oral forms of nicotine therapy include a micro tablet that releases nicotine sublingually and sugar-free nicotine lozenges.
- Lesser nicotine is provided in micro tablet as compared to nicotine gum, hence have to be taken more frequently with a maximum dosage of 80mg per day. On the other hand, lozenges deliver 25% and 27% more than the nicotine gums.
- At least 7-8 lozenges should be used per day with a maximum of 25 lozenges per day.

Nicotine Vaccine [48-50]

- A novel approach to assist in smoking cessation is the development of a nicotine-specific vaccine.
- Attaching nicotine to a suitable antigenic protein stimulates formation of antibodies (Nic-IgG) that has a high affinity and specificity for nicotine.
- These antibodies sequester nicotine in blood, thereby preventing its entry into brain.
- It could be administered on 2-4 occasions with effects lasting for several months.

Bupropion [22]

- Bupropion (Zyban) with its dopaminergic activity significantly reduces withdrawal symptoms and nicotine craving thus can be used for smoking cessation.
- It can be used to prevent relapse and attenuation of weight gain in abstinent smokers.
- A meta-analysis of several trials showed that bupropion nearly doubles cessation rates with an OR of 1.94; 95% confidence interval: 1.72-2.19, a similar efficacy to NRT.
- Side-effects of Zyban, which include a risk of 1 in 1000 of having a seizure. Other side-effects include dry mouth, difficulty in sleeping and a skin rash.

Varenicline [22]

- Champix (Pfizer) is the newest drug on the market and has been developed especially for smoking.
- Works by reducing the strength of the smoker's urge to smoke and by relieving craving and withdrawal symptoms.
- Varenicline is highly absorbed after oral administration. It doubled the odds of stopping smoking compared with placebo (odds ratio, 2.82; 95% confidence interval: 1.19-2.06) and was significantly better than bupropion (odds ratio, 1.56; 95% confidence interval: 1.16-2.06).
- It is licensed for use in all smokers, except in those with renal impairment, pregnant and/or breastfeeding.

Second line of drugs [51]

Nortriptyline

- Nortriptyline, a tricyclic antidepressant, has also been used and found to have similar quit rates as bupropion.
- 0.15mg – 0.75mg per day for 3-10 weeks.

Clonidine

- Clonidine, an alpha-2 adrenoceptor antagonist used in opiate and alcohol withdrawal, has also shown to diminish some of the tobacco withdrawal symptoms.

- The pooled odds ratio for success in six trials with oral or transdermal clonidine versus placebo was 1.89 (95% confidence interval: 1.30-2.74).

- 75–100 mg per day for 12 weeks can be prescribed.

Withdrawal symptoms: Irritability, fatigue, insomnia, anxiety, frustration, craving, restlessness, decreased heart rate, increased appetite or weight gain, anger, cough, dizziness, constipation, hunger, headaches, depressed mood, lack of concentration [21].

Benefits of Quitting [21]

- The deleterious effects on oral and systemic health gradually diminish over time [4].
- Risk of recurrent heart attacks and cardiovascular deaths are markedly reduced (50% or more) after smoking cessation.
- Blood pressure and pulse drop to a normal rate.
- Risk of cancer of the mouth, throat, esophagus, bladder, kidney and pancreas goes down. Short-term benefits include a reduction in bad breath [4].

Barriers in Tobacco Use Cessation Prevention Counselling [52]

They are classified into three categories:

- Barriers to implementing tobacco use cessation counselling.
- Barriers to participation in tobacco use cessation: Clinicians or Patients.
- Barriers to effectiveness of tobacco use cessation counselling

Tobacco Cessation in the Community [16, 53, 54]

- Performing individual or group meetings periodically about the importance of tobacco use cessation.
- Displaying educational material during the out-reach programs or in the urban or rural health centers where most of the population visit to seek health care.
- Developing and implementing school intervention models.
- Participating in talk shows, linking with NGOs to spread health awareness.
- Encouraging policies and programs that support prevention and cessation of tobacco use.
- Identifying high-risk groups like young adults and pregnant women and supporting them to stop tobacco use.
- The next generation of dentists and dental hygienist should graduate with competency in assessing and treating tobacco use.
- Dentists can display educational material on anti-tobacco themes in their clinics and hospitals, and prohibit the use of any kind of tobacco within 100 meters of their hospitals.
- Also a study by Mishra GA et al., reported that strict implementation of anti-tobacco laws in the community will prevent initiation and continuation of tobacco use [55].

Tobacco Cessation at State Level [56, 57]

- Reducing minors' access to tobacco products, disseminating effective school-based prevention curricula together with media strategies.
- Raising the cost of tobacco products.
- Using tobacco excise taxes to fund community-level interventions including mass media.
- Providing proven quitting strategies through health care organizations, and adopting smoke-free laws and policies.
- The Community Intervention Trial for Smoking Cessation (COMMIT) was a National Cancer Institute funded large scale study to assess a combination of community based interventions designed to help smokers cease using tobacco.

- India is the 7th country that has ratified the “WHO Framework Convention on Tobacco Control” (WHO FCTC) on 5th February 2004.
- The Tobacco Products Advisory Scientific Committee (TPSAC) was created as a result of the federal legislation Family Smoking Prevention and Tobacco Control Act of 2009 and also addresses dissolvable tobacco products.

Tobacco Cessation at National Level [4,16,58]

- Establishing a national coordinating mechanism includes government and non- government stakeholders.
- A national coordination mechanism should have four types of agencies: a National Regulatory Authority, a National Coordinating Body, an Inter-ministerial Coordination Committee, and a State Level Coordinating Body.
- Providing smokers with a national quit line can potentially reach an additional five million quitters per year, saving three million lives within two decades.
- Dental associations can advocate for the inclusion of tobacco cessation as an important component in national health programs such as the National Rural Health Mission, National Cancer Control Program and Reproductive and Child Health Program.
- Actively participate in World No Tobacco Day every 31st May.

Various Policies [59]

- ▶ Restrictive Policies.
- ▶ Information Dissemination Policies.
- ▶ Economic Incentive Policies.

Restrictive Policies

- Serve paternalistic government function, outlaw undesirable social behavior, and punish those who disobey.
- This set of policies can be further categorized as:
 - * Access controls
 - * Environmental controls
- Access controls describes policies intended to keep cigarettes out of the hands of adolescents and aim to make it more difficult to possess.
- These policies include restrictions in purchasing, requiring signs on vendors’ windows advertising such restrictions, mandates of identification inspection and the explicit licensing of tobacco sales.
- Most are now familiar with the deleterious effects of second hand smoke; as such ordinances have been enacted to limit citizens’ environmental tobacco smoke exposure.
- Moreover, Ferketich AK et al., stated that government tobacco control policies were positively related to the individual level tobacco policy [60].
- The evidence for these policies shows a moderate to no effect of such restrictions.

Information Dissemination Policies

- Involves the promotion and prohibition of promotion of tobacco products.
- As part of the tobacco settlement and the Master Settlement Agreement (MSA), the tobacco companies voluntarily subjected themselves in withdrawing all tobacco billboard ads and the use of cartons characters.
- The evidence of more direct types of anti-smoking information dissemination efforts does provide more positive news of these policies’ efficacy.
- Use of mass media towards a more personal message.

Economic Incentive Policies

- With regard to information dissemination campaigns, price changes make costs explicit; rather relying on the individual to incorporate the information intended to influence a consumer’s perception of discount rate or externalities.
- The method of mass campaigns and education relies on three steps to discourage smoking:
 - * The acceptance of information
 - * Internally adjusting costs and benefits
 - * Then ultimately making the decision not to smoke
- Taxation is a demand side technique to increase the price of cigarettes.
- Van Hasselt M et al., concluded that the 2009 federal cigarette tax increase was associated with a substantial reduction in smoking among young adults [61].
- Nevertheless, evidence pointing to the effectiveness of price is very significant and real.

Measures to Curb Tobacco Industry [3]

Various legislations and comprehensive tobacco control measures have been enacted by the Government of India as a key initiative to curb the tobacco industry.

- Cigarette Act (regulation of Production, Supply and Distribution), 1975 “Cigarettes smoking is injurious to health”, was to be displayed on all packets and cartons of cigarettes and cigarettes advertisements.
- Prevention of Food Adulteration Act (Amendment), 1990 – similar statutory warning for chewing tobacco and paan masala.
- The Drugs and Cosmetics Act, 1940 (Amendment), 1992, bans tobacco in dental care products.
- The Cable Television Networks (Amendment) Act, 2000, prohibits tobacco advertising in state-controlled electronic media and publications and on cable television [62].
- The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply, and Distribution) Act, 2003 (COTPA).
- In 2008, Section-4 of the COTPA specifying the smoke free rules into effect, prohibiting smoking in all public and work places from October 2, 2008.
- The Advocacy Forum for Tobacco Control (AFTC), a national alliance against tobacco, which advocates effective campaign for tobacco resulting in the modified and comprehensive Tobacco Control Bill that was passed in 2004.
- “World No Tobacco Day” is observed on the 31st May to highlight the adverse effects of tobacco on health.

CONCLUSION

Tobacco use continues to be a serious public health problem leading to the preventable cause of morbidity and mortality globally. Implementation of tobacco control measure should be stringently followed to decrease the prevalence of tobacco use and thus reduce the disease burden and deaths due to tobacco consumption.

The clear link between oral diseases and tobacco use provides an ideal opportunity for oral health professionals to partake in tobacco control initiatives and cessation programs. They should counsel their patients not to smoke; and reinforce the anti-tobacco message and refer the patients to smoking cessation services.

Government should establish Tobacco Cessation Clinics (TCCs) in peripheral health centers, district hospitals, and local health centers. Ban on all forms of tobacco advertising, promotion and sponsorship is a powerful tool to protect the people and curb the tobacco epidemic. Moreover, there should be availability of leaflets, brochures, continuing patient education materials regarding tobacco cessation.

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