

Smoking Cessation: An Update

Raj Kumar and Rajendra Prasad

Vallabhbai Patel Chest Institute, University of Delhi, Delhi, India

Abstract

Intervention for smoking cessation has become an urgent need because of increasing tobacco use and health hazards, especially in developing countries. Smoking cessation will be at different states of readiness. The states may be: (i) not ready (pre-contemplation), (ii) unsure (contemplation), (iii) ready (preparation), (iv) action, and (v) maintenance. Counselling and behavioural management is important. The '5 A's'-based intervention in the form of Ask, Advise, Assess, Assist and Arrange is implemented. Pharmacologic management is based on first-line treatment in the form of nicotine replacement therapy, bupropion and varenicline and second-line treatment as clonidine and nortriptyline. Every health professional has an obligation to help their patients to quit and the intervention should be diagnostic and therapeutic. The best results are obtained by behavioural and social support combined with pharmacotherapy whenever needed. The paper highlights the important component of intervention in smoking cessation.

[Indian J Chest Dis Allied Sci 2014;56:161-169]

Key words: Tobacco, Smoking, Respiratory diseases, Smoking cessation.

Introduction

Portuguese sailors brought tobacco to India in the Sixteenth Century and it was offered to Emperor Akbar. After an intense debate on the safety of the substance to be used by the emperor, the royal *hakim* (Physician) advised him to smoke only after it passes through water. Subsequently, the use of tobacco spread far and wide.

According to the World Health Organization (WHO), there are 1100 million smokers worldwide, which constitutes one-third of the global population aged 15 years and above. Of these, 800 million (73%) are in the developing countries. Globally, three million deaths occur every year due to tobacco use; two-thirds of these being in the developed nations.¹⁻³ It has been estimated that without urgent interventions, mortality due to tobacco use will rise to 10 million every year over the next 30 to 40 years; 70% of which will occur in the developing nations.¹⁻³ Death rate is three times higher in smokers than non-smokers of all ages. Tobacco consumption is increasing in South-East Asian region, among women, young and the poor.

According to an Indian Council of Medical Research (ICMR) report, India is the fourth largest producer of tobacco; and second in the world after China in cigarette and *bidi* production. There are 18.4 crore tobacco users in India with 4 crores using cigarette, 8 crores using *bidis* and 6 crores using chewable forms of tobacco. Nearly 45% of Indian men and 12% of women use some form of tobacco. It has been computed that tobacco kills 90 persons every minute, 2200 every hour

and 800,000 every year. It is predicted that by 2020, 13% of all deaths will be due to tobacco use.

The economic impact of tobacco consumption is tremendous; 9000 crore cigarettes are being smoked in a year costing about ₹18000 crores and ₹24400 crores is the sale value of all tobacco products. And what is the result of these whopping statistics? We get 400,000 cancer cases annually, 1,300,000 cases of cardiovascular and we are the world leaders in oral cancer. Further, we spend ₹27,761 crores on treating tobacco related diseases!

In a study by Kumar *et al*⁴, the prevalence of smoking among students of University of Delhi was 23.6% in boys and 3.9% in girls. Cigarette (97.6%) was the most common tobacco product used by the majority of college students. Seventy per cent used tobacco for fun and pleasure, 23.2% used it due to peer pressure, and 60.9% students started tobacco use at the age between 16-20 years. Some students started tobacco use as early as at 10-15 years while still in school.

Tobacco and Health

Tobacco smoke contains more than 4000 chemicals including nicotine, tar, carbon monoxide (CO), methoprene, propylene glycol, benzopyrene, butane, cadmium, acetone, ammonia, lead, benzene, formaldehyde, etc.; out of which 40 are known carcinogens. Tobacco consumption has far reaching health consequences. Adolescence beginners have a 50% life-time chance of dying from tobacco related diseases. Acute health risks include dyspnoea,

[Received: June 9, 2014; accepted: July 22, 2014]

Correspondence and reprint requests: Dr Raj Kumar, Professor and Head, Department of Respiratory Allergy and Applied Immunology, and Head, National Centre of Respiratory Allergy, Asthma and Immunology, Vallabhbai Patel Chest Institute, University of Delhi, Delhi, India; Phone: 91-09810146835; Fax: 91-11-27666549; E-mail: rajkumarvpcci@gmail.com

tachycardia, hypertension, exacerbation of asthma, impotence, infertility and increase in blood CO levels. Long-term health risks include: coronary artery disease, stroke, cancer of lung, larynx, oral cavity, pharynx, oesophagus, pancreas, bladder, cervix, leukaemia and chronic obstructive pulmonary disease (COPD). In earlier studies,⁵⁻⁶ the effect of smoking on atopic predisposition and sensitisation to allergens was studied and found that smokers had significantly higher IgE serum levels than reformed smokers and non-smokers. Smoking seems to induce an atopic orientation and allergen sensitisation in individuals. Kumar *et al*⁷ found that rhinitis was significantly more frequent in smokers compared to non-smokers. Further, rhinitis was more common in cigarette smokers as compared to *bidi* smokers.

Those who smoke not only harm themselves but also those around them by second-hand smoke. Among children, sudden infant deaths, respiratory illnesses, middle ear disease, gum and tooth disease and exacerbation of asthma are common due to this. Among the adults, lung cancer and heart diseases are known to occur. Kumar *et al*⁸ measured breath carbon monoxide (CO) levels of non-smoking subjects exposed to environmental tobacco smoke (ETS) i.e., waiters in hotels /restaurants/bars and observed that breath CO levels (ppm) were higher in this group compared to others. The mean breath CO levels were also significantly higher in ETS-exposed subjects who worked for more than nine hours a day in bars, restaurants and hotels and in subjects suffering from respiratory diseases compared to normal subjects.

In India, *bidi* smoking is more common. In a study to evaluate the breath CO concentration in cigarette and *bidi* smokers⁹, it has been found that although the average tobacco weight of a *bidi* (216.8mg) was significantly less than a cigarette (696mg), the average breath CO level was significantly higher in *bidi* smokers (18.9±7.7 ppm) compared to cigarette smokers (13.6±5.8 ppm) when total consumption of cigarette/*bidi* was more than five pack-years (p=0.002). One *bidi* may be considered to one cigarette for calculating "pack-years" of smoking. This study also concluded that *bidi* is equally or more harmful than cigarette smoking.⁹

Smoking and Tuberculosis

Tobacco smoking and tuberculosis (TB) are two major public health problems in the developing countries. The shift in smoking paradigm from industrialised world to developing world coincides with the increased prevalence of TB in these regions. About 17% of smoking population lives in India.¹⁰ At least one-third of the smokers belong to the middle age group, and as per surveys, it is in this age group that pulmonary TB is most prevalent. Males are affected 2 to 4 times more than females. Smoking unfortunately has received

social acceptance, despite it being a major health hazard. The socio-economic conditions, including poverty, over-crowding, poor ventilation and rooms with no natural light, poor nutrition and alcohol abuse have been associated with smoking and are also known risk factors for TB. Importantly, it is not only the smoker who is at the risk of TB, but, studies^{11,12} have validated the role of passive smoking, second-hand smoke and ETS exposure as a contributory factor in active TB.

Smoking and Indoor Air Pollution

Smoking is one of the leading causes of indoor air pollution and one-third of children are exposed to tobacco smoke in homes.¹³⁻¹⁷ Suspended particulate matter (SPM), sulphur dioxide (SO₂) and nitrogen dioxide (NO₂) levels are significantly higher in homes with smokers. Asthma symptoms, rhinitis and upper respiratory tract infection are also more frequent.

In view of the mortality and morbidity burden due to tobacco use, it has become imperative to take urgent steps to curb the growing menace of tobacco. It can be effectively done through a two-pronged approach: (1) large scale promotion to educate people about the harmful effects of tobacco use, and (2) benefits of quitting along with providing adequate help to those who want to quit. Various methods, available for quitting should also be publicised as most people who want to quit are not aware of these. Smoking cessation measures should be made a regular part of the curriculum and health-care delivery system.

Tobacco Cessation Services in India

Anti tobacco campaign in India is gaining momentum. The Supreme Court of India has made a ban on smoking in public places. This is perhaps the most significant anti-tobacco measure in recent years, although its enforcement leaves a lot to be desired! A Tobacco Products Bill 2001 is proposed that seeks to impose a ban on sponsoring of sports and cultural events by cigarette and other tobacco companies.

Until 2002 there were no formal tobacco cessation services available in India when the first clinic in India was set up in 2002, as a joint initiative of the Ministry of Health and Family Welfare, Government of India and the WHO. The initial phase involved the setting up of *Tobacco Cessation Clinics* in India and development of models for cessation.

The purpose of these clinics was to develop intervention models for tobacco cessation for smoking and smokeless tobacco users, generate experience in the delivery of these interventions, and finally, to study the feasibility of implementing these interventions and their acceptance.

At inception, senior clinicians from these institutions were exposed to a training programme on tobacco cessation in Thailand. All the *Tobacco Cessation Clinics* meet every year to evaluate themselves and

formulate future strategies under the Ministry of Health and Family Welfare, Government of India and the WHO.^{18,19} Subsequently, these clinics expanded to include training, community-based awareness programmes, and advocacy issues and were re-named as Tobacco Cessation Centres (TCCs) in 2005. The centres were further re-named as Regional Centres for Tobacco Cessation.

Stages of Readiness to Change Model

The stages of readiness to change model are valuable to assess a person's readiness to change a variety of behaviours. Tobacco users will be in different stages of readiness when the health-care provider approach them at different times, hence readiness needs to be re-evaluated (Figure). The stages may be: (1) not ready (pre-contemplation), (2) unsure (contemplation), (3) ready (preparation), (4) action, and (5) maintenance.

1. *Not ready (Pre-contemplation)*: These tobacco users are not seriously considering quitting in the next six months. They generally look at the positive aspects of tobacco and do not like to acknowledge the disadvantages or have been discouraged by failure in past quit attempts. They need to be encouraged to think about their tobacco use and may be invited for help and provided written information about long-term and short-term harmful effects of tobacco use to them.

2. *Unsure (Contemplation)*: These tobacco users are seriously considering quitting in the next six months. This group is particularly amenable to brief motivational interviewing, explore relevant health effects of tobacco use and barriers to cessation. One needs to find out other physical and mental health issues of relevance and offer them help with written information and about the support services.

3. *Ready (Preparation)*: These tobacco users are planning to quit in the next 30 days and have usually made a 24-hour quit attempt in the past year. This group can be motivated to quit soon and enable them to actually attempt to quit in the near future. This is a window of opportunity, which may only open for a short time, and is the group most likely to ask for help with quitting.

4. *Action*: These are former tobacco users who have quit in the last six months. This is when the risk of relapse is the highest, 75% of relapses occur in this stage, mostly within the first week. This is a period where support and strategies to prevent relapse are especially important. If relapse does occur it is important that this is not seen as a failure but as a learning experience.

5. *Maintenance*: These are tobacco users who quit over six months ago. The non-tobacco use behaviour is established and the threat of tobacco use gradually diminishes. The chances of relapse diminish over time and only about 4% of those who quit for more than two years ago ever go back to tobacco use.

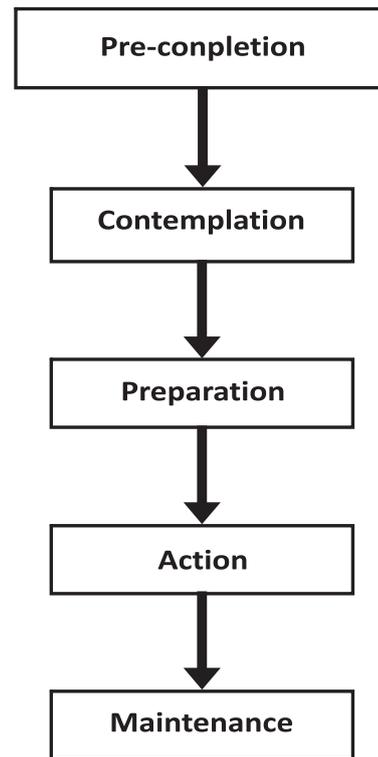


Figure 1. Schematic representation of various stages of readiness to quit use of tobacco.

Management Strategies

Management of tobacco cessation begins before the tobacco user seeks advice for quitting. This pre-contact stage or Stage 1 consists of educational campaigns designed for awareness and motivating tobacco users to quit. These awareness drives should be carried out through all available media, i.e., in the form of educational leaflets, advertisements in newspapers, short films on television, etc. Internet is also an effective medium for health education. Several websites provide appropriate guidance to tobacco users along with providing prompt and appropriate answers to the queries of the visitors. Information about other relevant health websites should be provided when using other media of publicity. The main focus of these media should be to inform about various effective methods, like behaviour counselling and nicotine replacement therapy that are available to a tobacco user who is planning to quit.

Stage 2 (Table 1) is the stage of active intervention that starts when the tobacco user comes in contact with the health care delivery system or when one seeks the advice for quitting from specialised tobacco cessation centers. This first contact should be appropriately utilised for proper motivation of the tobacco user. Before providing the behavioural therapy, assessment of dependence on tobacco should be done. Qualitative assessment of dependence can be done by asking the

subject whether it is difficult for him/her to refrain from smoking and whether there is a history of failed attempt to quit use of tobacco.²⁰ Quantitative assessment can be done through Fagerstrom's test for nicotine dependence²¹ (Table 2). Dependence is graded into mild, moderate and severe depending on the sum of the six responses in the Fagerstrom's test. A total score of 0-3, 4-6, and 7-10, respectively can be taken as mild, moderate and severe dependence.

interventions can be delivered through self-help materials including leaflets, manuals, audiotapes, videotapes²⁶ etc.

Arrangement for follow-up is very important as reinforcement of motivation etc through re-counselling at each visit is necessary to prevent a relapse. Repeated physician advice has been found to almost double the cessation rates in those trying to quit.²⁷ Telephonic contact should be made with subjects who are not

Table 1. Intervention stages

Stage 1	Stage of intervention before a tobacco user seeks advice for quitting
	Awareness efforts for promoting facts about tobacco consumption
	Motivating tobacco users to quit
	Publicising various methods available for tobacco cessation
Stage 2⁷	Stage of active intervention when subject seeks advice for quitting
	A. First contact stage
	Ask: Detail history of tobacco use
	Assessment of dependence of nicotine by Fagerstrom's test (table 2)
	Advice: Strongly advice to quit all forms of tobacco
	Assess: Assess the subject for willingness to quit
	Assist: Assist the subject in quitting through recommended treatment guidelines
	B. Stage of follow-up
	Arrange: Arrange for the follow up visits, with a provision for brief recounselling at each visit
	Telephonic counselling in case of defaulters who are not following the recommended visit schedule.

Treatment principle includes setting up goals of treatment and assessing the person's smoking status.

Goals of treatment: Long-term abstinence is the ultimate goal of the treatment. Initial goals include moving smokers from not contemplating smoking cessation to contemplating cessation to initiating a quit attempt, quitting for a short period. Harm reduction is also a desirable goal, but is also debatable because its health benefits are not well demonstrated. Management of withdrawal is also a goal of treatment.

Assessment: Assessment include the patient's current smoking status, readiness to change and motivation to quit, motivation for and barriers to quitting smoking history, psychosocial factors (social support, friends), patient's preferences and overall psychiatric and general medical evaluation.

Non-pharmacological Intervention

Counselling may be either a brief advice from a physician or a detailed work-up at a specialised TCC. Importance of a brief advice should not be underestimated as it has been shown that even a brief suggestion by a physician increases the quit rates.²² However, detailed counselling at specialised TCCs is more effective in motivating a tobacco user and is associated with higher rates of quitting compared to either a brief counselling or no intervention.²³⁻²⁵

Behavioural therapy for the subjects who are willing to quit is based around '5 A's - Ask, Advise, Assess, Assist and Arrange (Table 2).⁷ Behavioural

following the recommended follow-up visit schedule. In each follow-up visit or telephone contact, a repeat counselling should be provided with the main focus on problems faced by the subject in his attempt to quit, and during the period of abstinence. If the subject has quit than he/she should be congratulated for the success.

Behavioural Management

This refers to the skills and techniques that are critical to the care of all patients with nicotine dependence.

For the patients who wish to quit, there are interventions described as '5 A's —ASK, ADVISE, ASSESS, ASSIST and ARRANGE⁷ by the National Cancer Institute, USA

A. ASK: All tobacco users identified at each visit. Tobacco use status is queried and documented and general and vital information is obtained.

B. ADVISE: It should be clear, strong, and personalised according to the patient's current health/illness, motivation level or impact on the children in the household.

C. ASSESS: The willingness to quit. Provide motivational assistance to those unwilling to quit and provide additional information in special situations, such as adolescence and pregnancy.

D. ASSIST: Help the patient with a quit plan. Set a quit date within the next two weeks. The patient is advised to inform friends, family and co-workers about quitting and request understanding and support, anticipate challenges in quit attempt and educate about the

Table 2. Fagerström's test for nicotine dependence: a quantitative index of dependence⁵

Q1. How many cigarettes smoked per day do you smoke?	10 or less	0
	11 to 20	1
	21 to 30	2
	31 or more	3
Q2. How soon after you wake up do you smoke your first cigarette?	Within 5 minutes	3
	6 to 30 minutes	2
	31 to 60 minutes	1
	>60 minutes	0
Q3. Do you find it difficult to stop smoking in non-smoking areas?	No	0
	Yes	1
Q4. Which cigarette do you hate most to give up?	First one in morning	1
	Other	0
Q5. Do you smoke more frequently in the first hours after waking than rest of the day	No	0
	Yes	1
Q6. Do you smoke if you are so ill that you are in bed most of the day	No	0
	Yes	1

nicotine withdrawal symptoms. Remove all tobacco products from the environment and avoid places associated with smoking. Provide practical counselling (problem solving and skill training). Total abstinence is essential. In the past quit experiences; identify what helped and what hurt. Anticipate triggers or challenges in upcoming attempts. Alcohol use is to be minimised and inform the patient about the risk of relapse if continues to drink. Encourage house-mates to quit or not smoke in their presence. Provide intra-treatment social support and help to provide an extra-treatment social support. Recommend intensive treatment in the form of pharmacotherapies for those willing. Provide supplementary materials, which is culturally, racially, and educationally, and age appropriate for the patient.

E. ARRANGE: It requires arrangement for follow-up contact. Timing of first contact should be soon after the quit date and second follow-up depending on physician preference preferably within the first month of the quit date. Congratulate success. If failed, identify the cause and convey that relapse is a learning experience. Identify problems and anticipate future challenges. Consider referral to more intensive treatment.

For subjects who are not willing to quit the first time, a brief counselling should be provided to motivate them. Unwillingness to quit could be due to lack of information about the harm of tobacco use, concern and fear of quitting, financial reasons or demoralisation because of previous failed attempt.^{28,29} In these subjects, motivational intervention is based on '5 R's— Relevance, Risks, Rewards, Roadblocks, and Repetition (Table 3).

In addition to behavioural interventions, motivational support in the form of intra-treatment support from health care professionals and extra-treatment social support from family, friends and community members also useful in helping smoker to quit.³⁰⁻³²

Specific Psycho-social Treatments

1. Behavioural therapies include skills training and relapse prevention by identifying various causes, that can lead to relapses, and then learning how to deal with these situations. In aversive therapy, smoking is made aversive and less reinforcing by inducing mild nicotine intoxication symptoms of nausea and vomiting, etc. when the patient smokes (by rapid smoking). Nicotine facing is another form of

Table 3. Enhanced motivation to quit in subjects not willing to quit this time⁷

Relevance	Explain the relevance of quitting to the subject. Motivational counselling is more effective if context is relevant to the smoker, like harm of passive smoking to family members especially younger children.
Risks	Clinician should highlight the health hazards that are more relevant to the smoker. Emphasis should be to make the patient quit all forms of tobacco. Both short-term risks like harm to pregnancy, exacerbation of asthma etc. and long-term risks like myocardial infarction, COPD, cancers of lung, oesophagus, pharynx etc should be properly explained. Harm of passive smoking should also be emphasised.
Rewards	Benefits of quitting all forms of tobacco use should be explained to the tobacco user. Improved health of self and other family members, better physical performance, becoming a role model for younger children, saving of money and other relevant advantages should be explained to the patient.
Roadblocks	Barriers that the patient may face in his/her quit attempt should be identified. Withdrawal feature, fear and concern associated with quitting, depression, lack of social support, enjoyment of tobacco are some of the barriers that the patient may face in its attempt. Clinician should give proper guidance to the tobacco user to overcome these obstacles.
Repetition	Physician should give assurance to the patient that because of chronic nature of tobacco dependence relapses in the initial phases are common and multiple attempts may have to be made before a subject is able to quit tobacco. Repeat motivational counselling should be provided at each contact.

behavioural therapy i.e. by gradually reducing the nicotine yield of their cigarette.

2. *Self-help materials*: The major goals for specific self-help materials are to increase and impart cessation skills. Written manuals are the most common forms of self-material, although recently computer and video versions have been developed.

3. *Educational and supportive groups*: This is to teach the patients the harms of smoking and benefits of cessation and to provide group reinforcement for not smoking. This form of group seems to be promising.

Pharmacological Intervention (Table 4)

First-line drugs

At present seven first-line treatment agents are available out of which five are nicotinic-based and two are non-nicotinic. These are proven to be effective in smoking cessation.

Nicotine replacement therapy: The mechanism of action of NRT³³⁻³⁵ is thought to be through stimulation of nicotinic receptors in the ventral tegmental area of the brain and consequent release of dopamine in the nucleus of accumbens. However, NRT does not completely eliminate the symptoms of nicotine withdrawal because none of the medicinal nicotine products, which rely on systemic venous absorption, achieve rapid levels in the blood compared to levels of nicotine are reached following tobacco smoke inhalation. Nicotine in tobacco smoke reaches the brain within a few seconds compared to the medicinal nicotine that takes few minutes to hours.³³ The NRT has been shown to double the cessation rates.^{36,37} All types of NRTs viz., patch, gum, inhaler, and nasal spray have been shown to have similar success rates.³⁸ The NRT is

safe and should be recommended for smoking cessation.³⁹ Choice of NRT should be arrived at after discussing the subject preferences. With NRT, the subject is advised to abstain from smoking from day 1 of starting the therapy.

Recommended dosage schedule of NRT drugs as second-line drugs is given in table 4. In subjects complaining of insomnia, the nicotine patch should be used for 16 hours instead of 24 hours.³⁸ Subjects are advised to chew nicotine gums till a peppery taste emerges and then to keep it between the cheeks and gum, to be re-chewed when the taste fades. Nicotine gum is associated with mouth soreness and dyspepsia. The nicotine inhaler actually does not deliver any significant amount of the drug into the lungs, rather it delivers nicotine buccally,⁴⁰ irrespective of whether the breath is shallow or deep. Its pharmacokinetics is similar to nicotine gum. Due to its external resemblance to a cigarette,⁴¹ nicotine inhaler provides psychological fulfillment of cigarette smoking. Nicotine inhaler has been shown to double the cessation rates compared to controls (placebo).⁴¹

The delivery of nicotine using nasal spray is faster compared to other NRTs. However, it still does not match the swiftness with which the tobacco smoke inhalation delivers the nicotine.⁴² Peak levels of two-third of what is achieved by cigarette, can be reached in 10 minutes. In earlier studies, nicotine nasal spray was shown to be especially useful in highly dependent smokers.⁴³ In the early phase of treatment, the nasal spray is associated with nasal and throat irritation, rhinitis, sneezing, coughing and watering of eyes but tolerance to these develops in a week.⁴¹

Bupropion is a non-nicotine drug for treating tobacco dependence. It is an atypical anti-depressant that has both dopaminergic and adrenergic actions. A sustained-release preparation is available for smoking

Table 4. Pharmacotherapy for smoking cessation⁷

Pharmacotherapy	Dosage and Duration	Side Effects	Contraindications
Bupropion	150mg OD for 3 days followed by 150mg BD for 7 to 12 weeks	Dry mouth Insomnia	Seizure Head trauma Eating disorders
Nicotine patch	21mg/24 hours for 4 weeks, then 14mg/24 hours for 2 weeks, then 7mg/24 hours for 2 weeks	Local skin reaction Insomnia	
Nicotine gum	For 1-24 cigarettes — 2mg gum (upto 24 pieces/day) for 12 weeks For ≥ 25 cigarettes — 4mg gum (upto 24 pieces/day) for 12 weeks	Mouth soreness Dyspepsia	
Nicotine inhaler	6-16 cartridges/day for 6 months	Local irritation of mouth and throat	
Nicotine nasal spray	1-2 doses/hour for 3 to 6 months	Nasal irritation	
Clonidine	0.15mg/day to 0.75mg/day for 3 to 10 weeks	Dry mouth, Dizziness Drowsiness, Sedation	Rebound hypertension
Nortriptyline	75mg to 100mg/day for 12 weeks	Sedation, Dry mouth	Risk of arrhythmias

cessation. With bupropion the subject does not need to quit smoking from the start of the treatment as in the case of NRT. Instead, a quit date is decided preferably within 7 days to 14 days of starting treatment with bupropion. This is because steady state plasma concentration of bupropion and its active metabolites are achieved in approximately 8 days after initiation of therapy. The dosage of prescribing bupropion for smoking cessation is given in table 4. Food does not appreciably alter the absorption of bupropion. Efficacy of bupropion for smoking cessation has been proved in many studies.⁴⁴ This is equally effective in subjects with or without any past history of depression¹⁷ suggesting that its efficacy is not related to its anti-depressant effect. Bupropion is associated with only mild adverse effects, such as dry mouth and insomnia. For dry mouth, the subject is advised to drink plenty of water and for insomnia, the subject is advised to take the evening dose of bupropion at least 4 hours before going to sleep while maintaining a gap of 8 hours between the morning and evening doses. The immediate-release preparation of bupropion is associated with an increased risk of seizures. Therefore, it is contraindicated in subjects with a history of seizures. It is also contraindicated in subjects with a history of head trauma, heavy alcohol use and eating disorders like anorexia nervosa. Lower doses of bupropion SR (sustained release) should be used in patients with hepatic or renal impairment.²² Bupropion SR should be administered cautiously in patients taking medications that are known to lower the seizure threshold, such as antipsychotics, antidepressants, theophylline and systemic corticosteroids. Bupropion is strictly contraindicated in patients taking monoamine oxidase inhibitors (MAO inhibitors). At least a 14 days gap should be allowed between the discontinuation of MAO inhibitors and initiation of treatment with bupropion SR.^{9, 22}

In earlier studies^{23,24} it has been reported that the continuous abstinence rates in the counselling group at 1, 3, 6 and 12 months were 17.2%, 16.7%, 15.9% and 15.1 %, respectively, whereas in the medication group (bupropion 150mg twice a day), the rates were 59.8%, 57.5%, 54.0% and 52.9%, respectively.

In another study Singh and Kumar²⁴ assessed the effectiveness of sustained release bupropion and intensive physician advice in smoking cessation and found that bupropion helps in smoking cessation in Indian patients.

Bupropion can be used in combination with a nicotine patch, especially in heavy smokers for a better outcome.⁴² A combination of nicotine patch with nicotine gum or nicotine nasal spray increases the long abstinence rates over those produced by using a single form of NRT.²⁵

Varenicline acts as a selective partial agonist of $\alpha_4\beta_2$ and recently, it has been found that varenicline is a full agonist on the α_7 receptor although the

functionality is uncertain. It has been shown that varenicline is also effective and safe at a dose of 1mg per day for 12 weeks.

Second-line drugs

Clonidine: Clonidine is a post-synaptic alfa-2 agonist that dampens sympathetic activity originating at the locus ceruleus. Clonidine is given in doses of 0.5mg to 0.75mg per day for 3 weeks to 10 weeks.⁷ Treatment with clonidine is associated with dry mouth, sedation and dizziness.²⁵

Nortriptyline: It is given in doses of 75mg to 100mg per day for 12 weeks. It is associated with an increased risk of arrhythmias.²⁵

Smoking Cessation in Special Situations

Pregnant and breast-feeding mothers: Women who smoke during pregnancy and breast-feeding should be advised strongly against smoking. They should be asked to quit without taking the help of pharmacological treatment. However, if they are unable to quit with behavioural counselling then the use of NRT is justifiable in relation to continued smoking, as exposure to other toxic ingredients that are present in tobacco smoke does not occur with medicinal nicotine preparations. Pregnant and breast-feeding women who have opted for NRT should be advised to use short-acting products to minimise over-night fetal exposure to nicotine.

Cardiovascular disease: In patients with stable cardiovascular disease, use of NRT is safe. However, caution should be maintained while considering NRT in patients with unstable angina, myocardial infarction, or stroke as nicotine is a vasoconstrictor. However, medicinal nicotine is unlikely to be more harmful as compared to continued intake of nicotine through tobacco smoke. In these cases rapidly reversible NRT, such as nicotine gum or nasal spray, should be preferred over nicotine patch as with the latter, the absorption of nicotine may continue through the skin even after removal of the patch.

Smoking cessation in patients with chronic obstructive pulmonary disease: Smoking cessation is the most important strategy for the prevention and progress of chronic obstructive pulmonary disease (COPD). The current situation calls for an integration of smoking cessation into a routine management strategy in all chest clinics. Chest physicians who are treating patients with COPD must be aware about the smoking cessation methods and the use of the medication or NRT.⁴⁵

Weight gain apprehensive patients: Smokers who are apprehensive about weight gain associated with quitting should be prescribed bupropion or nicotine gum as these have been shown to delay but not prevent weight gain.⁷

Conclusions

In view of the effectiveness of various smoking cessation measures, it is prudent to include smoking cessation into the health care delivery system. Over the counter sales of some of these treatments have already been shown to be effective.³⁵ Therefore, awareness about the availability of these as over-the-counter drugs will be productive, although emphasis should be to motivate tobacco users to take help of specialised tobacco cessation centers for quitting as that has been shown to be most effective.

References

- Peto R, Lopez AD, Boreham J, Thun M, Heath C Jr. Mortality from tobacco in developed countries: indirect estimation from national vital statistics. *Lancet* 1992;339:1268-78.
- Peto R, Lopez AD, Boreham J, Thun M, Heath C Jr. *Mortality from smoking in developed countries 1950-2000: indirect estimates from national vital statistics*. Oxford: Oxford University Press, 1994.
- Peto R. Smoking and death: the past 40 years and the next 40. *Br Med J* 1994;309:937-9.
- Kumar R, Kushwah AK, Prakash S, Vijayan VK. A study of tobacco consumption among college students of University of Delhi, Delhi, India. *Indian J Prev Soc Med* 2010;41:198-202.
- Vijayan VK, Kumar R. Tobacco cessation in India. *Indian J Chest Dis Allied Sci* 2005;47:5-8.
- Goel N, Singh BP, Arora N, Kumar R. Effect of smoking on atopic predisposition and sensitization to allergens. *Indian J Chest Dis Allied Sci* 2008;50:329-33.
- Kumar R, Mahakud GC, Nagar JK, Tabassum, Goel N. Rhinitis and tobacco consumption: a brief study. *Indian J Allergy Asthma Immunol* 2011;25:15-20.
- Kumar R, Mahakud GC, Nagar JK, Singh SP, Raj N, Gopal K, et al. Breathe carbon monoxide level of non-smokers exposed to environmental tobacco smoke. *Indian J Chest Dis Allied Sci* 2011;53:215-19.
- Kumar R, Prakash S, Kushwah AK, Vijayan VK. Breath carbon monoxide concentration in cigarette and bidi smokers in India. *Indian J Chest Dis All Sci* 2010;52:19-24.
- Yach D. Tobacco consumption in India – Commentary. *J Public Health Policy* 2003;24:246-50.
- Boon SD, Verver S, Marais BJ, Enarsen DA, Lombard CJ, Bateman ED, et al. Association between passive smoking and infection with mycobacterium tuberculosis in children. *Pediatrics* 2007;119:1734-9.
- Kumar R, Behera D. Smoking and tuberculosis. *Indian J Tuberc* 2012;59:125-9.
- Kumar R, Nagar JK, Kumar H, Kushwah AS, Meena M, Kumar P, et al. Association of indoor and outdoor air pollutant level with respiratory problems among children in an industrial area of Delhi, India. *Arch Environ Occup Health* 2007;62:75-80.
- Kumar R, Nagar JK, Kushwah AS, Raj N, Meena M, Gaur SN. Indoor air pollution and respiratory function of children in Ashok Vihar in Delhi; an exposure-response study. *Asia Pacific Public Health* 2008;1:36-48.
- Kumar R, Nagar JK, Raj N, Kumar P, Kushwah AS, Meena M, et al. Impact of domestic air pollution from cooking fuel on respiratory allergies in children in India. *Asian Pac J Allergy Immunol* 2008;26:213-22.
- Kumar R, Nagar JK, Kumar P, Kushwah AS, Meena M, Srivastava JP. Impact of environmental tobacco smoke and indoor air pollution on respiratory allergy on children in Delhi. *Respirology* 2008;13:A117S.
- Kumar R, Nagar JK, Goel N, Kumar P, Kushwah AS, Gaur SN. Indoor air pollution and asthma in children at Delhi, India. *Ann Allergy, Asthma Immunol* 2013;111:A37.
- Desiraju K, Dharmshaktu NS, Gamlin S, Jain DC, Kumar R, Swasticharan L, et al. Operational Guidelines: National Tobacco Control Programme. National Tobacco Control Cell, Ministry of Health and Family Welfare, Government of India, 2012. Available at URL: <http://mohfw.nic.in/WriteReadData/1892s/2945310979Operational%20Guidelines.pdf>
- Kumar R, Kaur J, Murthy P, Deshpande S, Shah N, Munish VG. Tobacco Dependence Treatment Guidelines. National Tobacco Control Programme, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India, New Delhi;2011. Available at URL: <http://www.treatobacco.net/en/uploads/documents/Treatment%20Guidelines/India%20treatment%20guidelines%20in%20English%202011.pdf>
- Robert West. ABC of smoking cessation: assessment of dependence and motivation to stop smoking. *BMJ* 2004;328:338-9.
- Fagerstrom KO, Heatherton TF, Kozlowski LT. Nicotine addiction and its assessment. *Ear Nose Throat J* 1990;69:763-5.
- West R, McNeil A, Rao M. Smoking cessation guidelines for health professionals: an update. *Thorax* 2000;55:987-99.
- Kumar R, Kushwah AS, Mahakud GC, Prakash S, Vijayan VK. Smoking cessation interventionals and continuous abstinence rate at one year. *Indian J Chest Allied Sci* 2007;49:201-8.
- Singh P, Kumar R. Assessment of the effectiveness of sustained release bupropion and intensive physician advice in smoking cessation. *Lung India* 2010;27:11-18.
- A clinical practice guideline for treating tobacco use and dependence: a US public health service report. *JAMA* 2000;283:3244-54.
- Kumar R, Prakash S, Kushwah AS, Kumar H. Smoking cessation: control measures. *Lung India* 2005;22:66-71.
- Coleman T. Smoking cessation: integrating recent advances into clinical practice. *Thorax* 2001;56:579-82.
- Kumar R. Smoking and lung diseases. In: Behera D, editor *NCCP Text Book of Respiratory Medicine*. New Delhi: Jaypee Brothers Medical Publisher (P) Ltd; 2011;pp:747-751.
- Rundmo T, Smedslund G, Gotestam KG. Motivation for smoking cessation among Norwegian public. *Addict Behav* 1997;22:377-86.
- Jorenby DE. Smoking cessation strategies for 21st Century. *Circulation* 2001;104:51-2.
- Kumar R, Goel N. Magnitude of the problem of smoking in south-east Asia. In: Arora VK, editor *Manual on Tuberculosis HIV and Lung Diseases: A practical Approach*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2010;pp:379-88.
- Kumar R, Kumar H. Smoking cessation. In: Arora VK, Arora Raksha, editors *A Practical Approach to Respiratory Diseases*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2005;pp:435-41.
- Molyneux A. ABC of smoking cessation: nicotine replacement therapy: *BMJ* 2004;328:454-6.
- Pontieri FE, Tanda G, Orzi F, Chiara GD. Effects nicotine on nucleus accumbens and similarity to those of addictive drugs. *Nature* 1996;382:285-7.
- Dani JA, Biasi MD. Cellular mechanisms of nicotine addiction. *Pharmacol Biochem Behav* 2001;70:439-46.
- Silagy C, Mant D, Fowler G, Lancaster T. Nicotine replacement therapy for smoking cessation: database of abstracts of reviews of effectiveness. *Cochrane Database CD*:998.
- Fiore MC, Bailey WC, Cohen SJ, Dorfman SF, Goldstein MG, Gritz ER, et al. Smoking cessation. In: Rockville MD, editor *Agency for Health Care Policy and Research Clinical Practice Guideline No 18. Publication No 96-0692*. USA: US Department of Health and Human Services, 1996.
- Raw M, Mcneill A, West R. Smoking cessation: evidence based recommendations for the healthcare system. *BMJ* 1999;318:182-5.

39. Benowitz NL, editor. *Nicotine Safety and Toxicity*. New York: Oxford University Press;1998.
40. Bergstrom M, Nordberg A, Lunell E, Antoni G, Langstrom B. Regional deposition of inhaled ¹¹C-nicotine vapour in the human airway as visualized by positron emission tomography. *Clin Pharmacol Ther* 1995;57:309-17.
41. Hughes JR, Goldstein MG, Hurt RD, Shiffman S. Recent advances in the pharmacotherapy of smoking. *JAMA* 1999;281:72-6.
42. Schneider NG, Lunell E, Olmstead RE, Fagerstrom K-O. Clinical pharmacokinetics of nasal nicotine delivery: a review and comparison to other nicotine systems. *Clin Pharmacokinet* 1996; 31:65-80.
43. Ascher JA, Cole JO, Colin J, Feighner JP, Ferris RM, Fibiger HC, *et al*. Bupropion: a review of its mechanism of antidepressant activity. *J Clin Psychiatry* 1995;56:395-401.
44. Ferry LH, Burchette RJ. Efficacy of bupropion for smoking cessation in non-depressed smokers. *J Addict Dis* 1994;13: 249-51.
45. Kumar R, Vijayan VK. Smoking cessation programs and other preventive strategies for chronic obstructive pulmonary disease. *J Assoc Physicians India* 2012;58:53-6.