

TOBACCO CESSATION THROUGH NICOTINE REPLACEMENT THERAPY

**Dr. Nisha Rani Yadav¹, Dr. Meena Jain*², Dr. Ankur Sharma², Divya Vaishnavi⁴,
Gaurvi Vikram Kamra⁵, Dr. Aparna Aggarwal⁶ and Dr. Akanksha Monga⁷**

¹B.D.S, M.D.S., Senior Lecturer, Department of Public Health Dentistry, Manav Rachna Dental College, FDS, MRIIRS, Faridabad.

²M.D.S., Ph.D, Associate Professor and Head, Department of Public Health Dentistry, Manav Rachna Dental College, FDS, MRIIRS, Faridabad.

³B.D.S., Lecturer, Department of Public Health Dentistry, Manav Rachna Dental College, FDS, MRIIRS, Faridabad.

^{4,5}Fourth Year BDS Student, Manav Rachna Dental College, FDS, MRIIRS, Faridabad

⁶M.D.S., Associate Professor, Oral Medicine and Radiology, Jazan, Saudi Arabia.

⁷B.D.S, M.D.S., Senior Lecturer, Department of Public Health Dentistry, Manav Rachna Dental College, FDS, MRIIRS, Faridabad.

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***Corresponding Author**

Dr. Meena Jain

M.D.S., Ph.D, Associate
Professor and Head,
Department of Public Health
Dentistry, Manav Rachna
Dental College, FDS,
MRIIRS, Faridabad.

ABSTARCT

Nicotine dependence and withdrawal can develop with all forms of tobacco. Nicotine present in tobacco causes numerous health risks. It also causes tobacco addiction by producing pleasing effects in brain which make an individual to consume another cigarette. In every 2 to 3 years tobacco users try to quit but because of nicotine dependence, they find it difficult to do so. So, for those tobacco users nicotine replacement therapy is a good Nicotine replacement therapy is a good method of tobacco cessation. It replaces much of the nicotine which a person was consuming in the form of tobacco. The agents used in nicotine replacement therapy reduce the withdrawal symptoms and hence reduces the motivation for smoking too. These agents are available as skin patches, oral and nasal spray, inhalers and lozenges,

nicotine tablets and chewing gums. They deliver nicotine at lesser rate than cigarettes smoking. Skin patches deliver nicotine slowly as compared to all other forms. It is one of the best methods of tobacco cessation they are generally well tolerated and produce minimal side

effects.

INTRODUCTION

One of the greatest single causes of death and cancer is tobacco according to World Health Organization (WHO).^[1] WHO reported that there are 1.1 billion smokers in the world and more than 7 million deaths annually are related to the direct effects of tobacco, while some 890,000 results from exposure to second hand smoke.^[2,3] As estimated by WHO, India is a home for 12 percent smokers and death rate is 10 million per year due to tobacco use.^[4,5]

Tobacco control is a priority area for the WHO and hence various steps have been taken by it for this field.^[6] The consequences of smoking have an excessive impact on public health-care and on their earning. Also reducing tobacco consumption is important for the overall population's health.

Tobacco is injurious to health and it's mainly due to its composition. Composition of tobacco is harmful alkaloid and highly addictive, stimulant alkaloid.^[7] Various forms of tobacco are available worldwide. Dried leaves of tobacco are taken by consumers in different forms like chewable tobacco, dried snuff and wet snuff. These leaves are mainly used in cigarettes and cigars, and pipes. Some consumers use cigarettes, cigar and other forms of smoked tobacco. Tobacco produces many harmful effects in our body and affects many organs, especially brain, heart, lungs and liver. It is one of the most important causes of cancer. Dried form of tobacco is hard to quit. Its repeated use develops withdrawal symptoms and addictiveness which fail to use to quit tobacco.^[7]

Different methods of tobacco cessation have been introduced in all the countries which help in quitting tobacco consumption. One of them is the 5A's model, which includes the following steps: ask (about tobacco use); Advise (strongly suggest quitting); Assess (the subject's willingness to modify her/his behaviour); Assist (set a date to begin the process); and Arrange (follow-up). On the basis of clinical guidelines generally there are two types of treatment i.e. medications alone and medications plus counselling. Medication plus counselling is used oftenly because it doubles the probability of success. Medications which found to be more effective in tobacco cessation are non-nicotine medication such as Bupropion -Brand name SR(Zyban), Varenicline tartrate (Chantix).^[8]

Nicotine replacement therapy (NRT) is one of the methods of tobacco cessation. Aim of NRT

is to reduce motivation of the patient to consume tobacco. Further, when NRT is used then it has been observed that the psychological and psychomotor withdrawal symptoms occurs very less.^[6,9] Many clinical guidelines have also been done on NRT as a method to stop smoking and it has been seen that it has been proved to be a first line of treatment of choice to stop smoking.^[2,10] So, the present review was done to explain the mechanism of action as well as its various forms. Search engine used were PubMed & Google Scholar for the relevant topic nicotine replacement therapy.

NICOTINE - MECHANISM OF ACTION

Our nervous system has nicotine acetylcholine receptors (nAChRs) on which nicotine present in tobacco acts. As, the Acetylcholine neurotransmitter acts in every parts of body organ hence, nicotine also affects whole body parts. Nicotine acetylcholine receptors have five subunits. Out of them eleven AChRs subunits are expressed in the brain including alpha 2 to 7, alpha 9, alpha 10 and beta 2 to beta.^[11] Nicotinic Receptors can be in heteromeric form or homomeric forms – alpha and beta subunits or alpha units respectively. These receptors alter psychological and psychomotor function and leads to nicotine dependence. They also affect cardiovascular and autonomic function.

Nicotine binds to the outside of a nAChR and in channel opens, sodium, potassium ions gain entry inside the channel. First receptors are activated and then desensitization occurs.^[12] Various effects of smoking such as on mood, cognitive and relaxation are thought to occur via nicotine's stimulation.^[13] NRT also acts as a coping mechanism which makes tobacco less rewarding. Nicotine from cigarettes takes only few seconds in high dose to reach to brain whereas medicinal products achieve lower levels in minutes. It takes minutes for nasal sprayer, oral products such as gum, inhalator, sublingual tablets or lozenges and hours for transdermal patches.^[10]

This therapy is a medical approved therapy.^[14] It is used to stop chewing tobacco and to quit smoking cigarettes.^[13,15] It is estimated that the chance of quitting smoking increases by about 55 percent by NRT.^[16] It is sometimes use along with behavioural techniques.^[13] It is also effective in treating ulcerative colitis.^[13] Use of multiple types of NRT at a time may increase effectiveness.^[17,18] Types of NRTs include the adhesive patch, chewing gum, lozenges, nose spray and inhaler.^[13]

Different Methods of Nicotine Replacement Therapy

1. Nicotine Patch^[19]

It is one of the methods used in nicotine replacement therapy. It releases into the body through skin. As it is a transdermal patch so it is considered as one of the safest methods of cessation of tobacco in any patient by Food and Drug Administration (FDA). A meta-analysis done on NRT found that 20 percent of people treated with Nicotine Replacement Therapy remain away from smoking for at least one year. Its dosage depends on number of cigarettes patient smoked in a day. If a person consumes 5-10 cigarettes per day then it is 14 mg/qd and if he is consuming 11-20 cigarettes per day then it is 21 mg/qd. It is not avoided and not to be given in patients with severe reactive airway disease. Insomnia, local skin reaction, slight change in taste and smell, nasal blockage and congestion are its side effects.

2. Nicotine Gum^[20]

Tissues of the mouth absorb this form of nicotine replacement product and then it is delivered into bloodstream through that tissue. It is found in various colours and flavours in market. It is available in single foil package. Nicotine content in it is found to be usually either 2mg or 4mg. It is approximately one sixth to one third of a cigarette with the sufficient content. Further, the dosage of this product depends on smoking habits of the user. Popular brands of nicotine gums are Nicotex, Nicorette, Nicogum, Nicotinell and Zonnic. Nicotine gum. For long lasting effect, it can be used in combination with transdermal patch. It has been observed that for tobacco cessation in patient, combination therapy is more effective than single agent. It is first chewed slowly till the time the taste become strong. After that it is placed between gum and cheek. Then, again it is chewed slowly till its taste fades completely. It should not be swallowed. This has to be repeated for 30 minutes. Side effects of nicotine gums are mouth soreness, pain in jaws, hiccups, dyspepsia, and jaw ache. These side effects are usually mild and transient.

3. Nicotine lozenge^[20]

It dissolves in mouth and release nicotine slowly over the time period of 20 to 30 minutes. It is a flavoured tablet which contains a dose of nicotine polacrilex. Nicotine lozenges dosage is 2mg and 4mg in 9-15 pieces. It has to be moved in mouth side to side. It should not be swallowed in excessive amount as well as a whole. Its side effects are headache, nausea, cough, heartburn and hiccups. These side effects occur in very few patients.

4. Nicotine inhaler^[20,21]

This inhaler comes with 3-6 cartridges and the patient has to take 2 shallow puffs every 2 seconds and alternatively 4 puffs every minute. This has to be continued for about 30 minutes. Its dosage is 15mg in a plastic cartridge. It has to be taken 3-4 times for 13 weeks and then decreased slowly the dose for next 8-12 weeks. It is usually available in market as 'Nicotoral'.

5. Nicotine nasal spray^[22]

This nicotine replacement product is absorbed through tiny blood vessels of nose and nasal passage. This helps in relieving the patients push to smoke and also allows removing the psychological dependence of smoking. Each bottle of nicotine spray contains 10 ml of nicotine and it releases around 0.5mg of nicotine into blood. It should be avoided when cravings are not there and it should not be inhaled. Contact with lip should also be avoided while using it. One or two sprays should be used only for 30 to 60 minutes. Only nasal irritation and few times taste in smell and taste is noted as side effects of nasal sprays.

Nicotine Vaccine – A new approach

It is a new approach which has been developed to relieve nicotine dependence. It is an incomplete antigen which uses immune response of a person. In order to stimulate the immune response, it needs a carrier protein. It is used for relapse cases also.^[23,24] It has been observed that both active and passive immunization are used as the mode of immunization in case of nicotine vaccine. Active immunization causes activation of T cell and B cell whereas passive immunization helps in providing immediate protection.^[25] Nicotine vaccine is available as NicVAX, NIC002, TA-NIC, SEL-068. However, the limitations of nicotine vaccines are that they are generally short lived and there is a difficulty to attain appropriately high body titre. Further, significant variation in individual response to vaccine has been also noted in some cases.^[25,26,27]

Side Effects And Limitations Of Nicotine Replacement Therapy

It has been observed that excessive and long-term effect of nicotine replacement products in non-smokers leads to increase the risk of heart events. However, no such risk has been seen in smokers. It may be due to the reasons that the hemodynamic effects of nicotine have a relatively flat dose-response relationship. Further, cigarettes deliver nicotine more rapidly than gum or patches which make more powerful hemodynamic effects. Also, it has been seen that nicotine obtained from nicotine replacement products typically decreases nicotine intake

from smoking.^[22]

Many NRT users discontinue treatment before time.^[28] This occurs in patient's whose craving for tobacco, dependency and withdrawal symptoms are being controlled by NRT. So, the patient mistakenly thinks that treatment is no longer required.^[29,30] All these assumptions affect the effectiveness of NRT. However, this problem could be solved by providing proper instructions and scientific information by health professionals to those patients who are seeking NRT.^[31]

Proper care has to be taken when NRT is given to patients having systemic problems like diabetes, hypertension, cardiac problems, renal and hepatic diseases. Also, in expectant mothers it is advised to stop smoking as it produces effect in a foetus, there is a chance of unborn child many times. So, in pregnant women, intermittent NRT is more preferable method. Further, the nausea associated with early stage of pregnancy make transdermal patch the most recommended option.^[30] But the patch has to be removed in such patients before going to bed.^[32]

CONCLUSION

The most common addiction factor is nicotine which made difficult to quit it. It is one which is responsible for withdrawal symptoms. Now a day, many medicines containing nicotine are available in market. They are available in different colours, flavours and many forms with appropriate dose. Nicotine replacement therapy is one of the best therapies help the patient to quit Tobacco. Choice of NRT product depends on patient preferences. NRT is available as gum, inhaler, nasal spray, transdermal patch and lozenges. There use, produce no medical problem but patient compliance is reduced because patients use to stop this therapy prematurely after getting temporary relief. To improve their efficacy, NRT researches are focusing on rapidly delivery technique and these modalities require more quality research.

Considering the potential capacity of NRT, it is important for health professionals to get aware with all these different forms of NRT so that they can provide valuable advice when required in their patients who are tobacco users and who have interest in leaving tobacco habit.

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