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REVIEW ARTICLE

NON-PHARMACOLOGICAL MODALITIES FOR TOBACCO CESSATION: AN OVERVIEW

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Abstract

Tobacco use is widely prevalent since so many years worldwide. Tobacco's negative effects are well-known, and there is strong evidence that its constituents are responsible for cancer, oral problems, other health hazards and even deaths. Also, tobacco users with COVID-19 have higher risk of severity. Therefore, Cessation is necessary to lower this risk from coronavirus, and other illnesses. Consumers are looking for alternative methods to quit tobacco use. Numerous pharmacologicaland non-pharmacological strategies havebeen tried for tobacco cessation.Although pharmacological approaches have been reported more effective but non pharmacological approaches are also gaining importance and popularity. This review article is primarily focused on non-pharmacological approaches for Tobacco Cessation.

Introduction:-

History of Tobacco use

Tobacco has been used by humans since 600 A.D.[1]It was introduced by Columbus in Europe who learned about it during his historical voyages to the Caribbeans.[2]In the sixteenth century,tobacco was introduced to Portugal and through these Portuguese traders it was then introduced into India at the end of Akbar's reign, in 1604which firstly became popular among the noblemen and soon gained widespread popularityamong the common people as a form of smoking tobacco (in hookahs or chillums).[3,4,5]Tobacco became a major item of use, cultivation, and trade in India by the end of the seventeenth century.[5,6,7]

Current Scenario

India ranks second largest tobacco user and producer worldwide.[7,8] Tobacco is being used inwide variety of formsin India such as smoking forms (beedi, cigars, cigarettes, dokha, hookah, tobacco pipes, e-cigarettes) and smokeless forms (chewing tobacco, creamy snuff, Pan with tobacco, dipping tobaccos, gutka, snuff, snus,betel quid chewing, mishri, khaini, and as an ingredient of pan masala).[9]Tobacco cultivation takes up around 0.25 percent of India's agricultural land.[10]It is currently known that the tobacco industry supports the livelihoods of around 45.7 million Indians.6 million farmers, 20 million agricultural labourers, 4 million leaf pluckers, 8.5 million workers in processing, manufacturing, and exports, and 7.2 million workers in retailing and trade make up the industry.[11]In addition to 45.7 million people dependent on tobacco industriesdirectly, there are millions more whorely on it

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indirectly, such as indirectly, such as those employed in packing, warehousing, flavour& fragrance, paper, jute, mentha, areca nut, transporters, and so on.[12]

The Global Adult Tobacco Survey 1 (GATS 1-2009-10) report revealed that 34.6% of adults aged 15 and above (men 47.9%, women 20.3%) in India were using tobacco in some form (smoked and/or smokeless tobacco). Among the adults 29.1% are daily tobacco users and 5.4% are the occasional users. The prevalence of tobacco use among men is 47.9%, while among women it is 20.3%. According to this survey, 25.9% of adults use smokeless tobacco (men 32.9%; women 18.4%) and 14% of adults smoke (men 24.3%; women 2.9%)[3]

The Global Adult Tobacco Survey 2 (GATS 2-2016-17) report revealed that 28.6% (266.8 million) of adults aged 15 and above (men 42.4%, women 14.2%) in India currently use tobacco in some form (smoked and/or smokeless tobacco). Among adults, 24.9 percent (232.4 million) are the daily tobacco users and 3.7 percent (34.4 million) are the occasional users. Among men the prevalence of tobacco use is 42.4%, whereas among women its prevalence is 14.2%, according to this survey.[13,14] 21.4% (199.4 million) of adults use smokeless tobacco (men 29.6%; women 12.8%); 10.7% (99.5 million) of adults smoke (men 19.0%; women 2.0%).[15]

The prevalence of tobacco usage has reduced from 34.6 percent in GATS 1 (2009-10) to 28.6 percent in GATS 2 (2016-17). The relative decline in the tobacco use prevalence is 17.3% which is statistically significant. The prevalence of daily tobacco usage and occasional ones hassignificantly decreased by 14.4% & 31.5% respectively. Likewise, the prevalence of tobacco smoking has dropped from 14.0 percent in GATS 1 (2009-10) to 10.7 percent in GATS 2 (2016-17).The prevalence of daily smokers and occasional ones has significantly reduced by 19.6% and 36.4% respectively.[3] [as shown in **Table 1**[3]].

Table 1:-Change in the prevalence of tobacco use, smoking and smokeless tobacco use GATS 1 India, 2009-10 and GATS 2 India, 2016-17[3].

	Tobacco use			**Tobacco smoking**			**Smokeless tobacco use**		
	2009-10	**2016-17**	**Relative change**	**2009-10**	**2016-17**	**Relative change**	**2009-10**	**2016-17**	**Relative change**
Overall									
Current user	34.6	28.6	-17.3**	14.0	10.7	-23.6**	25.9	21.4	-17.4**
Daily user	29.1	24.9	-14.4**	10.7	8.6	-19.6**	21.4	18.2	-15.0**
Occasional user	5.4	3.7	-31.5**	3.3	2.1	-36.4**	4.5	3.1	-31.1**
Men									
Current user	47.9	42.4	-11.5*	24.3	19.0	-21.8**	32.9	29.6	-10.0**
Daily user	40.8	36.9	-9.6**	18.3	15.2	-16.9**	27.4	25.1	-8.4**
Occasional user	7.1	5.5	-22.5**	5.9	3.8	-35.6**	5.4	4.5	-16.7**
Women									
Current user	20.3	14.2	-30.0**	2.9	2.0	-31.0**	18.4	12.8	-30.4**
Daily user	16.7	12.4	-25.7**	2.4	1.7	-29.2**	14.9	11.1	-25.5**
Occasional user	3.5	1.8	-48.6**	0.5	0.3	-40.0**	3.5	1.7	-51.4**
Urban									
Current user	25.3	21.2	-16.2**	11.2	8.3	-25.9**	17.7	15.2	-14.1**
Daily user	21.1	17.9	-15.2**	8.4	6.3	-25.0**	14.7	12.8	-12.9**
Occasional user	4.2	3.3	-21.4**	2.8	1.9	-32.1**	3.0	2.5	-16.7**
Rural									
Current user	38.4	32.5	-15.4**	15.1	11.9	-21.2**	29.3	24.6	-16.0**
Daily user	32.5	28.6	-12.0**	11.6	9.8	-15.5**	24.2	21.1	-12.8**
Occasional user	5.9	3.9	-33.9**	3.5	2.2	-37.1**	5.1	3.5	-31.4**
Note:*p<0.05**p<0.01									
Adapted from Global Adult Tobacco Survey Second Round (GATS 2) India: 2016-2017[3]									

Tobacco kills over 8 million people every year all around the world.More over 7 million of these fatalities are caused by direct tobacco use, whereas 1.2 million fatalities are the result of inhaling secondhand smoke by the nonsmokers.[16]Tobacco consumption kills roughly one million Indians per year: Every year, over 926,000 individuals die as a result of smoking and secondhand smoke exposure.[17]Smoking history or exposure to

secondhand smoke has also been identified as a key indicator of COPD aetiology.[18]India accounts for 74 percent of the worldwide burden of smokeless tobacco usage, killing an extra 200,000 people per year.[19,20]

Constituents of Tobacco

Tobacco smoke consists of various chemical that are toxic to smokers as well as nonsmokers. Inhaling tobacco smoke even in a small volumecan be harmful.[23-26]At least 250 of the over 7,000 compounds included in tobacco smoke are known to be toxic, including hydrogen cyanide, carbon monoxide, and ammonia.[23,24,27] Among 250 known toxic chemicals in smoke of tobacco, minimum 70 of them can cause cancer. Also, some of these chemicals in this highly toxic mixture are the same constituents used to produce chemical weapons, lighter fluid, pesticides, car batteries, paint thinners and other substances that one would never dream of inhaling into one's lungs.[28]

The cancer-causing chemicals are enlisted in **Table 2**[23,24,27]

Table 2:-Table showing Toxic chemicals present in tobacco smoke[23,24,27]**.**

SNo.	Toxic chemicals in smoke of tobacco
1.	Acetaldehyde
2.	Aromatic amines
3.	Arsenic
4.	Benzene
5.	Beryllium (a toxic metal)
6.	1,3–Butadiene (a hazardous gas)
7.	Cadmium (a toxic metal)
8.	Chromium (a metallic element)
9.	Cumene
10.	Ethylene oxide
11.	Formaldehyde
12.	Nickel (a metallic element)
13.	Polonium-210 (a radioactive chemical element)
14.	Polycyclic aromatic hydrocarbons (PAHs)
15.	Tobacco-specific nitrosamines
16.	Vinyl chloride

Tobacco/Smoking and its related Health Hazards

It is proven fact that tobacco and its products can lead to different types of cancer and many other types of diseases. Smoking and Smokeless tobacco use can cause cancer almost anywhere in your body, including:[23][as shown in **Table 3**[23]]

Table 3:- Table showing Type of Tobacco Consumption and associated important Cancer [23].

Types of Tobacco Consumption	Types of Cancer caused
Smoking	Blood (acute myeloid leukemia)
	Bladder
	Cervix
	Colon and rectum
	Esophagus
	Kidney and renal pelvis
	Larynx
	Liver
	Lungs, trachea, and bronchus
	Mouth and throat
	Pancreas
	Stomach
	Prostate
	Breast
	Ovarian

	Brain Tumor
Smokeless tobacco	Esophagus
	Mouth and throat
	Pancreas

Currently it is estimated to be about 480,000, with millions more living with smoking-related diseases. Currently 5.6 million youth of 0-17 years age are estimated to encounter premature mortality from illness attributed to smoking.[23] [as shown in **Figure 1**[29]]

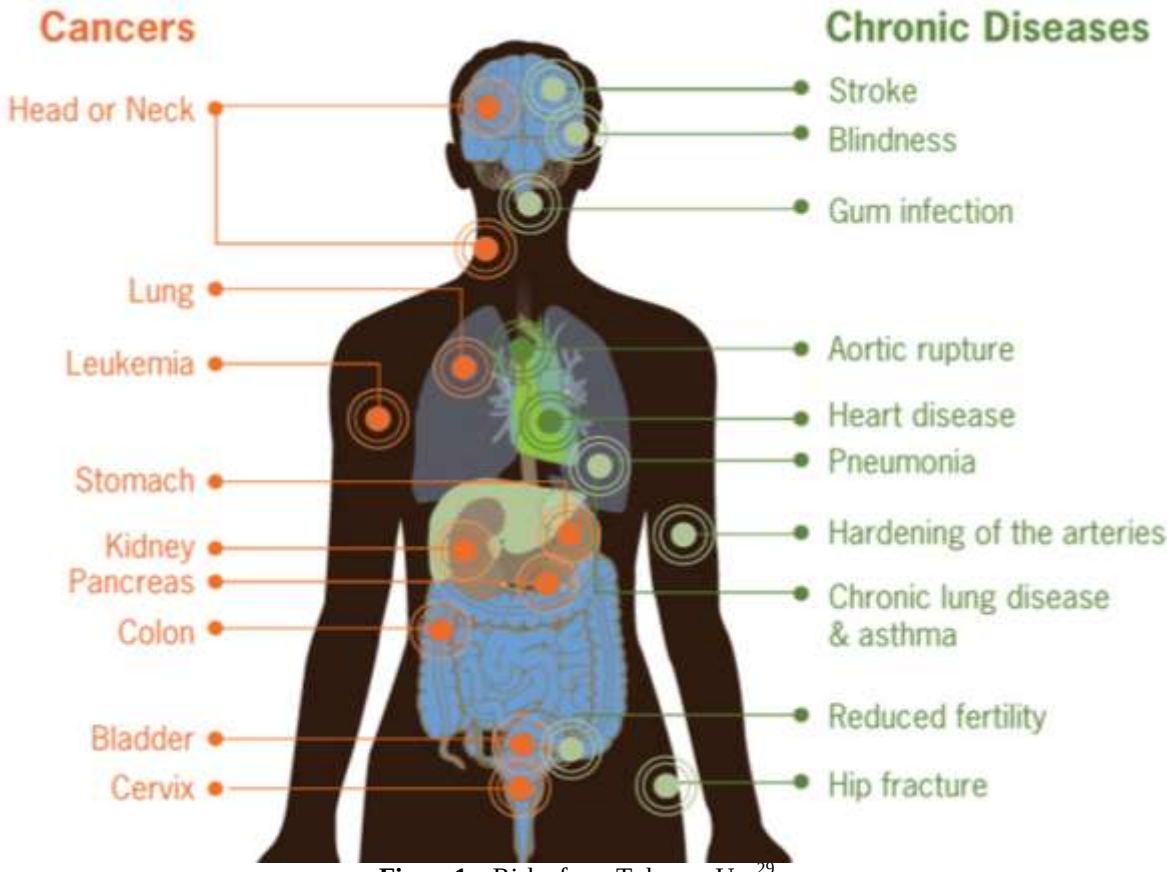

Figure1:- Risks from Tobacco Use[29].

Tobacco and Smoking may also cause various other health hazards including: [as shown in **Table 4**[26,27,17,19,20]]

Table 4:-Tableshowing Other Health Hazards caused by Smoking and Smokeless tobacco use[24,25,18,19,20,21,22].

	Other Health Hazards
1.	ASTHMA
2.	CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) [which includes emphysema and chronic bronchitis]
3.	PNEUMONIA
4.	TUBERCULOSIS
5.	OTHER RESPIRATORY ILLNESSES AND REDUCED LUNG FUNCTION
6.	HEART DISEASES, STROKE
7.	AORTIC ANEURYSM (a balloon-like bulge in an artery in the chest)
8.	TYPE 2 DIABETES
9.	DEMENTIA
10.	HEARING LOSS
11.	GASTROINTESTINAL DISEASES

12.	INFLAMMATION
13.	WEAKENED IMMUNE SYSTEM
14.	LOWER BONE DENSITY (Leading to OSTEOPOROSIS,)
15.	RHEUMATOID ARTHRITIS
16.	CATARACTS
17.	AGE-RELATED MACULAR DEGENERATIONAND VISION LOSS
18.	SKIN DAMAGE
19.	REDUCED FERTILITY IN MEN AND WOMEN
20.	ERECTILE DYSFUNCTION
21.	SUDDEN INFANT DEATH SYNDROME
22.	MENSTRUATION AND MENOPAUSE
23.	BIRTH DEFECTS
24.	REDUCED FETAL GROWTH, LOW BIRTH WEIGHT AND PRETERM DELIVERY
25.	FETAL DEATH

As we all know, COVID-19 is an infectious disease that primarily attacks the lungs. For many respiratory infections,tobacco smoking is a known risk factor and also it increases the severity of respiratory diseases. Tobacco use is also a major triggering agent for non-communicable diseases like cardiovascular disease, diabetes,cancer and respiratory disease which lead people to higher risk with these conditions for developing severe chronicillness when affected by COVID-19. Available research suggests that smokers and tobacco users with COVID-19 have up to a 50% higher risk of developing severe disease, increased hospitalization and death compared to non-smokers.

Therefore Tobacco/Smoking Cessation is the urgent need so quitting is best thing smokers/tobacco users can do to lower their risk not only from the coronavirus, but also from the risk of developing heart diseases,cancers and respiratory illnesses.[23,33]The patients must be emphasized the fact that quitting at any stage is beneficial and will not only improve the quality of life but will strengthen the economic status too. They must also be conveyed that tobacco in any form and in any dosage is harmful.[34]

There are ~ 1.1 billion people worldwide who use tobacco products, and most of these want to stop.[34]Of smokers, ~ 70% report that they want to quit a third of them try to stop smoking each year, but only 20% of them seek help.[36,37,38]Most quit attempts are unassisted (will-power alone) and are associated with low success rates (3-5%).[39]In addition, the majority of people who successfully stop smoking relapse. Smokers as compared to tobacco users have higher success rates when seeking help to quit. Still giving it uppermanently is hard and often require several attempts before achieving long-term abstinence.[36,37,38]

Tobacco/Smoking Cessation Modalities

For a Tobacco user, Cessation is declared when one stops tobacco consumption and sustained for a period of least one yearat the time of re-examination. [40,41]Tobacco/Smoking Cessation intervention is much effective in both sexes, all racial and ethnic groups, all age groups and in pregnant women.[42,43]Studies state that only 3-5% of quit attempts are unassisted and are associated with will-power alone. This indicates low success rates.[39]Thus,will-power alone cannot effectively help in tobacco cessation. That is why there is requirement of pharmacological and non-pharmacological intervention for effective Tobacco cessation. There is a limited range of pharmacological and non-pharmacological options available for cessation. These broadly include: [as shown in **Table 5**[44-63]]

Table 5:- Table showing Pharmacological & Non-Pharmacological Options for Tobacco Cessation.

PHARMACOLOGICAL APPROACHES	NON-PHARMACOLOGICAL APPROCHES
First line treatment	Dietary based interventions[57]
Nicotine Replacement Therapy (NRT):[44,45]	Yoga-based interventions[58]
• Bupropion[46]	Pranayama (breathing exercise)[59]
• Nicotine polacrilex Gums[47]	Dhyana (meditation)[60]
• Nicotine trans-dermal patch[48]	Moderate intensity exercise[61]
• Nicotine lozenge[49]	Cognitive behavioral therapy[61,62]
• Nicotine nasal spray[50]	Hypnotherapy[63]
• Nicotine aerosols (inhaler)[51]	Acupuncture[63]

• Nicotine Sublingual tablet[52]	
• Nicotine injection[53]	
Second line treatment	
Clonidine[54]	
Nortriptyline[55]	
Varenicline[56]	

The new non-pharmacological strategies are described below:

Dietary based interventions-
Current evidence suggests that tobacco use cessation is effective and brief dietary interventions may be effective.[64]The impact of health behaviour change counselling has evidence for the promotion of other healthy lifestyles such as alcohol withdrawal, and physical activity.[65]Studies in past state that increasing intake of omega 3 fatty acids in smokers and tobacco consumers shall decrease craving effect and decrease their tobacco intake.[66-70]Tobacco Cessation and dietary brief interventions conducted in the dental setting can be effective and thus can improve people's oral health.[55]

Yoga-based interventions-
Yoga combining a practice of movement, breathing, or relaxation has been linked to improved positive mood.[71]Quitting tobacco use is challenging because it combines behavioural, cognitive, and physiological domains. Yoga-based interventions have the potential to become an accessible, cost-effective, and innovative treatment in tobacco cessation and reinforce quitting tobacco once formal treatment ends.Thougha longer period of follow-up may be needed.[57]

Pranayama (breathing exercise)-
Breathing exercises can reduce cravings for cigarettes acutely in the laboratory. Breathing practice is simple, easy, nontoxic, cost-effective and should be encouraged to support reduction in tobacco consumption.[72]Further research is also needed to determine whether such exercises can be effective in the field, and therefore benefit smokers wanting to stop.[58]

Dhyana (meditation)-
The practice of mindfulness and meditation is a central aspect of mind–body interventions.[73] Trait mindfulness has been inversely associated to severity of nicotine dependence and withdrawal, and positively associated to smoking cessation self-efficacy.[74] There has been inverse relationship between time of meditation practice and number of cigarettes/day.[75] Smoking cessation also found a significant positive correlation between compliance with home meditation practice and smoking abstinence.[76,77]It is suggested that mind–body practices could be beneficial for improving smoking cessation.[78]

Moderate intensity exercise-
Exercise has been examined as an adjunct to smoking cessation treatment[79]because of its ability to reduce cigarette cravings, withdrawal symptoms.[80]Previous research has shown a significant positive effect of vigorous intensity exercise on smoking cessation.[81]Preliminary indication that adherence to moderate intensity exercise may enhance the efficacy of the nicotine patch and brief cessation counseling for short-term smoking cessation.[59]

Cognitive behavioral therapy-
Cognitive-Behavioral Therapy for Smoking Cessation offers fundamental counseling strategies & interventions that have already been established, researched as well as refined over the past decades. It should be included in the treatment of any smoker who have difficulty in quitting.[82]NRT combined with CBT, vigorous exercise combined with CBT, Standard treatment combined with CBT may facilitate smoking abstinence in patients during a quit attempt.[81,83,84]CBT smoking cessation interventions are efficacious among smokers.[85]

Hypnotherapy-
Hypnotherapy has been used as an aid for smoking cessation, especially in attempting to lessen the urge to smoke.[86]Hypnotherapy combined with counseling appears to be more effective.[87] Hypnosis deals directly with the subconscious mind. It is the subconscious mind that directs human body to feel urge for cigarette.[88] It is proposed to

act on underlying impulses to weaken the desire to smoke or strengthen the will to stop.[89]Thus hypnotherapy has a therapeutic effectiveness in achieving a high rate of smoking cessation.[90]

Acupuncture-

Acupuncture has been reported as an effective treatment for some addictions.[91]Many smokers have used acupuncture in an attempt to limit or alleviate nicotine withdrawal symptoms.[86]Ear acupuncture is a safe method for smoking cessation.[92]Effects of acupuncture on smoking craving were found significant.[93]Acupuncture was safe and a possible treatment for tobacco cessation, but it requires further study to establish its role.[94]

Conclusion:-

Tobacco use has been a curse since more than 500 years and it is well known that tobacco use is injurious to healthbut still the increase in the rate of smoking and tobacco consumption is day by day increasing due to its craving effect. Tobacco cessation is not a mirage, it's a possibility. Tobacco cessation will be helpful in reducing the progression of COPD and other health hazards.[95] Not only nicotine replacement therapy but also nutritional support improves nutritional intake, anthropometric measures, functional status and health related quality of life and also the clinical outcomes among tobacco users.[96]

Physicians and dentists can play an important role to inform their patients of the dangers of tobacco smokingas well as update them with pharmacological and non-pharmacological methods of cessationto reduce tobacco use and soonquitting. Although pharmacological approaches have been reported more effective but non pharmacological approaches are also gaining importance and popularity. Counselling, motivation, peer group persuadingpharmacological and non-pharmacological intervention together can play an important role in Tobacco Cessation in making Tobacco free world. Hence more scientific reasons are required with large sample size for evaluation of non-pharmacological interventions like yoga, diet and lifestyle interventions.

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