Original Research Paper

Volume - 13 | Issue - 06 | June - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Dental Science

START RUN, BEFORE SMOKE RUIN – THE EFFECTS OF EXERCISE ON SMOKING CESSATION

Dr. C.S. Prabhahar*	MDS, Best Dental Science College, Madurai, Tamil Nadu. *Corresponding Author.
Dr. M. Umayal	MDS, Best Dental Science College, Madurai, Tamil Nadu.
Dr. T.B. Meenalochani	MDS, Best Dental Science College, Madurai, Tamil Nadu.
Dr. M. Tamilarasan	MDS, Best Dental Science College, Madurai, Tamil Nadu.
Dr. L. Thaha Bareera	First year Post Graduate, Best Dental Science College, Madurai, Tamil Nadu.

ABSTRACT The impact of tobacco on health status is boundless. Smoking tobacco is responsible for various diseases including cancer, cardiovascular disease, pulmonary disease, periodontal disease etc. Smoking has been identified as a major risk factor in the development and progression of periodontal disease. Smoking cessation reduces the risk of many diseases. However cravings and withdrawal syndromes have been associated with smoking relapse. Thus exercise plays a significant role in the management of tobacco withdrawal symptoms and cravings that anticipate smoking relapse.

KEYWORDS : Tobacco, smoking, smoking cessation, exercise, endorphins.

INTRODUCTION

Exercise has been recommended as an aid to smoking cessation[1]. Exercise has been shown to have some similarities to smoking in its effects on stimulating the central nervous system[2] and on neurobiological processes in the brain including increasing beta-endorphin levels in smokers and consequently it has been argued that exercise may provide an alternative reinforce to smoking[3]. Exercise may also play an important role in the acute management of tobacco withdrawal symptoms (e.g. depression, irritability, restlessness, poor concentration) and cravings that predict smoking relapse[4]. Hence, aim of this review is to understand the effects of exercise on smoking cessation.

EPIDEMIOLOGY AND PREVALANCE OF SMOKING

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing more than 8 million people a year, including around 1.2 million deaths from exposure to second-hand smoke [5]. Tobacco use is a major risk factor for many chronic diseases, including cancer, lung disease, cardiovascular disease and stroke. It is one of the major causes of death and disease in India and accounts for nearly 1.35 million deaths every year. India is also the second largest consumer and producer of tobacco. Nearly 267 million adults (15 years and above) in India (29% of all adults) are users of tobacco, according to the Global Adult Tobacco Survey India, 2016-17. The most prevalent form of tobacco use in India is smokeless tobacco and commonly used products are khaini, gutkha, betel quid with tobacco and zarda. Smoking forms of tobacco used are bidi, cigarette and hookah [6].

SMOKING AND CRAVING FOR SMOKING

Tobacco is one of the most addictive drugs and significant research has been dedicated to the understanding of the psychobiological mechanisms underlying its addictive nature [7-9].Cravings are defined as persistent urges, thoughts or desires to smoke a cigarette. Cravings are one of the most consistent predictors of relapse in previous smokers [10].

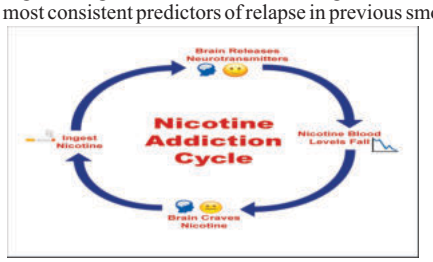


Figure 1: Nicotine addiction cycle

ENDORPHIN AND SMOKING

During smoking → Brain's nerve cells release neurotransmitters→ The nicotine molecule is shaped like acetylcholine (neurotransmitter) → Once nicotine reaches the brain, its able to attach to the acetylcholine receptors & mimic its actions → Nicotine also raises endorphin & dopamine → Pleasure and euphoric effects [11]

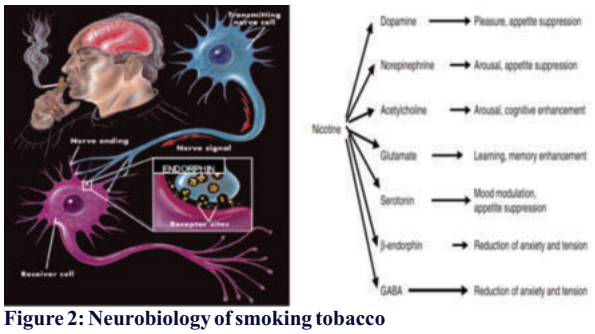


Figure 2: Neurobiology of smoking tobacco

SMOKING CESSATION

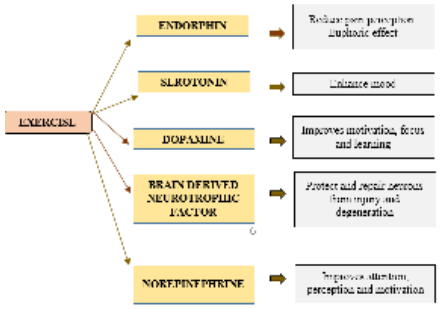
Nicotine dependence is a chronic, relapsing disease driven by addiction to nicotine. A proactive approach is needed, offering treatment to all smokers regardless of their level of readiness to quit. Treatment should be individualized based on the severity of nicotine dependence and the probability of developing withdrawal symptoms, as well as on comorbidities, local resources, and patient preferences [12].

TRADITIONAL METHODS

Psychological approach
Nicotine Replacement Therapy
Antidepressants
Smokeless tobacco
Electronic cigarettes
Cognitive behaviour therapy
Set a quit plan and quit date
Self help
Competitions and incentives
Hypnosis acupuncture

RECENT CONCEPT

Physical exercise



Flow chart 1: neurotransmitters released in body during exercise

PHYSICAL ACTIVITY AND ENDORPHIN

Exercise is a body activity that enhances or maintain physical fitness and overall health and wellness. Beta endorphin levels have been measured in the circulation and in several other tissues in response to exercise 13. It has been reported by a number of investigators that the intensity of exercise is important in significantly altering circulating beta endorphin levels. These studies suggested that a critical intensity of exercise [> 60% maximum oxygen uptake] was needed to increase circulating beta endorphin levels 14-16. Several neurotransmitters are released during exercise.

PHYSICAL ACTIVTIES

Aerobic exercise

Any activity that uses large muscle groups, can be maintained continuously and is rhythmic in nature. This type of exercise rely on aerobic metabolism to extract energy in the form of adenosine triphosphate from amino acids, carbohydrates and fatty acids. Examples of aerobic exercise include cycling, dancing, hiking, jogging/long distance running, swimming and walking[17].

Anaerobic exercise

Intense physical activity of very short duration, fueled by the energy sources within the contracting muscles and independent of the use of inhaled oxygen as an energy source. Without the use of oxygen, our cells revert to the formation of ATP via glycolysis and fermentation. This process produces significantly less ATP than its aerobic counterpart and leads to the build-up of lactic acid. Exercises typically thought of as anaerobic consist of fast twitch muscles and include sprinting, high-intensity interval training and power lifting etc[18].

Harness training

Harness the horse (a set of straps placed on animal so that it can pull heavy things). A restraint or support, especially one consisting of a loop or network of rope or straps. A collection of wire or cables bundled and routed according to their function[19].

T'ai chi

T'ai chi, as a form of moving meditation, follows many of the same principles of Zen practice, which includes focus of the mind on one point (e.g., the leading or active hand in t'ai chi), relaxed unified posture, and deep breathing[20-21].

Table 1: Examples of different types of exercise

Aerobic exercise	Anaerobic exercise
	
Harness training	T'ai chi
	

EXERCISE AFTER LOBECTOMY

Decreased exercise capacity and health-related quality of life are common in people following lung resection for non-small cell lung cancer [22-23]. People with lung cancer are affected by weight loss, anorexia, anemia, protein catabolism and muscle wasting [24]. Dyspnea and fatigue are also common and are likely to result in a decline in physical activity levels as well as the adoption of a sedentary lifestyle .Training included aerobic exercises, strengthening (resistance) exercises, or a combination of these, with or without inspiratory muscle training improves exercise capacity and health-related quality of life, as well as reducing symptoms of dyspnea and fatigue for people with a range of chronic conditions, including chronic obstructive pulmonary disease and heart failure, as well as in people with prostate and breast cancer [25-26].

EXERCISE ONCOLOGY

Exercise has been proposed as a possible cancer treatment. The Exercise as Cancer Treatment (EXACT) framework proposes nine distinct clinical oncology scenarios based on tumor/disease status and treatment status at the time of the proposed exercise treatment[27].Exercise can help counteract the negative effects of cancer and its treatment patients with cancer who do not exercise have a higher degree of functional impairment, worse cancer-related fatigue, more psychological distress and a poorer quality of life [28-30]. Exercise has been established as the most effective first-line treatment for cancer-related fatigue, significantly reducing its presence and severity, psychological distress associated with cancer, alleviating depressive symptoms and anxiety and greater quality of life across multiple cancer-specific and general health domains. Exercise also appears to reduce the risk of patients with cancer developing other chronic diseases that may be exacerbated by cancer and its treatment, such as cardiovascular disease, diabetes and osteoporosis [31-32].

ROLE OF PERIODONTIST IN SMOKING CESSATION

The associations between tobacco use and diseases affecting the oral cavity, such as periodontal disease and cancer, are now well recognized [33-34]. Dentists are well placed to recognize smokers and dentists can identify the impact of tobacco use in the mouth. In order to promote smoking cessation: 1.The profession and individual practices need to agree the roles of the dental team in smoking cessation 2. Primary care trusts need to ensure the smoking cessation needs of dental patients are met locally. 3. Dental team members providing smoking cessation services should be permitted to prescribe nicotine replacements. Thus, members of the dental team have the potential to help smokers to better health and oral health [35].

CONCLUSION

Treating any ailment through medication always have its own adverse effects and may at time it reappears. Aberrant habits like smoking tobacco has become not only a personal self-inflicted problem but also a social disturbance factor which needs nicotine replacement therapy, psychological management and so on. Exercise and smoking cessation are both independently beneficial for health [36].Studies showed that 15 minutes of exercise of low-to-moderate intensity not only reduced absolute cravings but also attenuated increases in some craving and withdrawal symptom responses to a smoking. After exercise, strength of desire to smoke, tension, stress, and poor concentration did not increase in response to lit cigarette [37].

The present review showed that all these physical activities have its role in endorphin secretion acts as an adjunct to smoking cessation.

REFERENCES

1. Ashelman M. W. Stop Smoking Naturally. New Canaan, CT: Keats Publishers; 2000.
2. Russell PO, Epstein LH, Erickson KT. Effects of acute exercise and cigarette smoking on autonomic and neuromuscular responses to a cognitive stressor. Psychological Reports 1983;53:199–206.
3. Dishman RK, & O'Connor, PJ. Lessons in exercise neurobiology: The case for endorphins.June 2009. Mental Health and Physical Activity, 2(1):4-9.
4. Leelarungrayub D, Pratanaphon S, Pothongsunun P, Sriboonreung T, Yankai A, Bloomer RJ. Vernonia cinerea Less. supplementation and strenuous exercise reduce smoking rate: relation to oxidative stress status and beta-endorphin release in active smokers. Journal of the International Society of Sports Nutrition 2010;7:21.
5. Global Burden of Disease ,Washington, DC: Institute of Health Metrics; 2019.
6. Shekhar Grover ,Tobacco Use Among the Youth in India: Evidence From Global Adult Tobacco Survey-2 (2016-2017), Tobacco Use Insights.
7. Marlatt GA, Gordon JR. Relapse prevention: maintenance strategies in the treatment of addictive behaviors. New York: Guildford, 1985.
8. Piasecki T. M., Niaura R., Shadel W. G., Fiore M. C., Baker T. B. Smoking withdrawal dynamics in unaided quitters. J Abnorm Psychol 2000; 109: 74–86.
9. Shiffman S., Paty J. A., Gnys M., Kassel J. D., Hickcoc M. First lapses to smoking: within-subjects analysis of real time reports. J Consult Clin Psychol 1996; 64: 366–79.
10. Killen JD, Fortmann SP. Craving is associated with smoking relapse: findings from three prospective studies. Exp Clin Psychopharmacol (1997) 5(2):137–42.
11. J L del Arbol, Plasma concentrations of beta-endorphin in smokers who consume different numbers of cigarettes per day, pharmacol Biochem Behave 2000 Sep;67(1):25-8.
12. Clinical Practice Guideline Treating Tobacco Use and Dependence 2008 Update Panel, Liaisons, and Staff. A clinical practice guideline for treating tobacco use and

dependence: 2008 update. A US Public Health Service report. Am J Prev Med 2008; 35(2):158–176.
13. De Meirleir K, Naaktgeboren N, Van Steiteghem A, et at. Betaendorphin and ACTH levels in peripheral blood during after aerobic and anaerobic exercise. Eur J Appl Physiol 1986; 55: 5-8.
14. Goldfarb AH, Hatfield BD, Armstrong D, et at. Plasma beta-endorphin concentration: response to intensity and duration of exercise. Med Sci Sports Exerc 1990; 22: 241-4.
15. Goldfarb AH. Hatfield BD, Potts J, et al. Beta-endorphin time course response to intensity of exercise: effect of training status. Int J Sports Med 1991; 12 (3): 264-8.
16. McMurray RG, Forsythe WA, Mar MH, et al. Exercise intensity-related responses of ~-endorphin and cathecholamines. Med Sci Sports Exerc 1987; 19: 570-4.
17. Wahid A, Manek N, Nichols M, Kelly P, Foster C, Webster P, Kaur A, Friedemann Smith C, Wilkins E, Rayner M, et al. Quantifying the Association Between Physical Activity and Cardiovascular Disease and Diabetes: A Systematic Review and Meta-Analysis. J Am Heart Assoc. 2016.
18. American College of Sports Medicine. ACSM's guidelines for exercise testing and prescription. USA: Lippincott Williams & Wilkins; 2013.
19. Effect of Harness Training With Swiss Ball Core Exercises Program on Muscular Endurance among Men Basketball Players ,Mar, 2019 Volume: 16 / Issue: 4 Pages: 1377 – 1380.
20. National Center for Complementary and Alternative Medicine. Tai chi. December 12, 2010.
21. Brazier D. Zen Therapy. New York: John Wiley and Sons, 1995.
22. Cavalheri V, Burtin C,Exercise training undertaken by people within 12 months of lung resection for non-small cell lung cancer, Cochrane Database of Systematic Reviews ,Jun 17, 2019 .
23. Cesario A, Ferri L, Galetta D, Pasqua F, Bonassi S, Clini E, et al. Post-operative respiratory rehabilitation after lung resection for non-small cell lung cancer. Lung Cancer 2007;57(2):175-80.
24. Baracos VE, Reiman T, Mourtzakis M, Gioulbasanis I, Antoun S. Body composition in patients with non-small cell lung cancer: a contemporary view of cancer cachexia with the use of computed tomography image analysis. American Journal of Clinical Nutrition 2010;91 Suppl:1133-7.
25. Granger CL, Parry SM, Edbrooke L, Denehy L. Deterioration in physical activity and function differs according to treatment type in non-small cell lung cancer - future directions for physiotherapy management. Physiotherapy 2016;102(3):256-63.
26. Cavalheri V, Jenkins S, Cecins N, Phillips M, Sanders LH, Hill K. Patterns of sedentary behaviour and physical activity in people following curative intent treatment for non-small cell lung cancer. Chronic Respiratory Disease 2016;13(1):82-5.
27. Kerry S. Courneya ,Exercise as cancer treatment: A clinical oncology framework for exercise oncology research, Front. Oncol., 02 September 2022.
28. Cormie P, Zopf EM, Zhang X, Schmitz KH. The impact of exercise on cancer mortality, recurrence, and treatment-related adverse effects. Epidemiol Rev 2017;39(1):71–92.
29. Ashcraft KA, Warner AB, Jones LW, Dewhirst MW. Exercise as adjunct therapy in cancer. Semin Radiat Oncol 2019;29(1):16–24.
30. Christensen JF, Simonsen C, Hojman P. Exercise training in cancer control and treatment. Compr Physiol 2018;9(1):165–205.
31. Campbell A, Stevinson C, Crank H. The BASES expert statement on exercise and cancer Survivorship. J Sports Sci 2012;30(9):949–52.
32. Mustian KM, Alfano CM, Heckler C, et al. Comparison of pharmaceutical, psychological, and exercise treatments for cancer-related fatigue: A meta-analysis. JAMA Oncol 2017;3(7):961–68.
33. Johnson NW, Bain CA . Tobacco and oral disease. EU working group on tobacco and oral health. Br Dent J 2000; 189: 200–206.
34. Gelskey SC . Cigarette smoking and periodontitis: methodology to assess the strength of evidence in support of a causal association. Community Dent Oral Epidemiol 1999; 27: 16–24.
35. N Monaghan, What is the role of dentist in smoking cessation? British Dental Journal,2002, volume 193, page 611-612.
36. Walking reduces cue-elicited cigarette cravings and withdrawal symptoms, and delays ad libitum smoking -Adrian Taylor-Nicotine & Tobacco Research Volume 9, Number 11, 2007.
37. Scott Rollo, Wuyou Sui, Harry Prapavessis.. Exercise as a smoking cessation aid, April 2019, The Neuroscience of Nicotine - Mechanisms and Treatment. Chapter 55 (pp.pp. 459-465).