International Journal of Community Medicine and Public Health
Alzahrani HH et al. Int J Community Med Public Health. 2023 Jan;10(1):423-427
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20223567

Review Article

Pharmacological approach to smoking cessation and effective intervention models

Hadeel H. Alzahrani[1]*, Yasir M. Alasmari[2], Najwa A. Almutairi[3], Shikhah G. Aldajani[4], Faisal O. Alanazi[5], Amal A. Alsadiq[6], Eman J. Alanazi[7], Hakeemah A. Abu Moailo[6], Jalawi T. Alotaibi[8], Ammar M. Alsubhi[9], Abdulrahman H. Bagais[9], Ghassan M. Asfour[10]

[1]Alnaeem Primary Healthcare Center, King Fahad General Hospital, Jeddah, Saudi Arabia
[2]Department of General Surgery, King Abdulaziz Specialist Hospital, Skaka, Saudi Arabia
[3]Oman Pharmaceuticals Product CO.L.L.C, Jeddah, Saudi Arabia
[4]Alhusseiniya Primary Healthcare Center, Ministry of Health, Mecca, Saudi Arabia
[5]Department of Internal Medicine, King Abdulaziz Specialist Hospital, Sakaka, Saudi Arabia
[6]College of Medicine, Medical University of Warsaw, Warsaw, Poland
[7]East Riyadh Dental Center, Ministry of Health, Riyadh, Saudi Arabia
[8]College of Medicine, University of Tabuk, Tabuk, Saudi Arabia
[9]College of Medicine, King Abdulaziz University, Rabigh, Saudi Arabia
[10]General Physician, Charity for Smoking and Drugs Harms Awareness (KAFA), Mecca, Saudi Arabia

Received: 10 December 2022
Revised: 13 December 2022
Accepted: 19 December 2022

***Correspondence:**
Dr. Hadeel H. Alzahrani,
E-mail: Halzahrani@moh.gov.sa

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

One of the main public health issues is tobacco use, which is also associated with considerate morbidity and mortality worldwide. Smoking cessation lowers mortality and risk of future cardiovascular events. Smoking is a true chronic condition that is defined by the emergence of a dependency state that is primarily caused by nicotine. Smokers are typically unable to quit smoking on their own. There are numerous approaches to treating smoking addiction, including both non-pharmacological such as behavioural counselling and pharmacological therapy. The effectiveness and safety of smoking cessation medications in everyday life are currently widely acknowledged. The primary pharmacological methods for quitting smoking include nicotine replacement therapy, varenicline, bupropion, and cytisine. Even in patients with chronic cardiovascular disease, their effectiveness and safety have been demonstrated. It has been demonstrated that nicotine replacement therapy, bupropion, varenicline, and cytisine increase the likelihood of cessation. Both varenicline and nicotine replacement therapy in combination are powerful tools for cessation. The likelihood of quitting is likewise increased by nortriptyline. Research suggests that none of the treatments seem to have a frequency of adverse reactions that would limit their usage. The clinician should tailor the smoking cessation strategy based on the most recent scientific data and the patient's preferences, giving particular attention to those patients who have certain cardiovascular and psychiatric comorbidities. The purpose of this research is to review the available information about pharmacological approach to smoking cessation and effective intervention models.

Keywords: Smoking, Cessation, Quit, Pharmacological

INTRODUCTION

Smoking is a key contributor to cardiovascular disease, cancer, and chronic obstructive pulmonary disease, which is why it adds so much to the mortality load. In addition to these illnesses, smoking cigarettes also worsens reproductive outcomes, produces additional respiratory symptoms, and lowers health status. Furthermore, exposure to second-hand smoking is a recognized risk factor for lung cancer, coronary heart disease, and a number of other harmful health outcomes.[1] Over thirty illnesses and ailments are now recognized as being caused by active smoking. Contrary to popular belief, smokers really have a three times higher chance of dying prematurely than non-smokers. It has been demonstrated that passive smoking also has a wide range of detrimental impacts on health. Additionally, the underlying causes of a number of diseases, including the onset of cancer, ischemic heart disease, and nicotine dependence spurred by smoking have been substantially revealed.[2] As per the World Health Organization (WHO), tobacco use accounts for one in ten deaths globally and results in 7 million fatalities annually. By 2030, 8 million people a year will die from diseases attributable to tobacco use if current consumption trends continue. About 201,773 women worldwide perish from second-hand smoking each year.[3]

Smoking cessation lowers mortality and risk of subsequent cardiovascular events. Regardless of age, comorbidities, or the length and intensity of individuals smoking habit, all smokers can benefit by quitting.[4] Almost 70% of smokers say they want to stop, and every year, 40% succeed for at least one day. Although some seriously addicted smokers try to stop, they are unable to do so for more than a few hours. Finally, just 3% of smokers successfully stop each year, and over 80% of those who make an independent quit attempt go back to smoking within a month. The cost-effectiveness of smoking cessation programs has been repeatedly verified, despite the ongoing discussion about whether it is appropriate to allocate money for individual cessation rather than policy measures and treatments. Behavioural counselling to increase motivation and support attempts to quit, as well as pharmacological intervention to lessen nicotine reinforcement and withdrawal symptoms, are all methods for assisting smokers in quitting. Simple encouragement to quit smoking enhances the rate of success, and counselling boosts abstinence rates in proportion to the amount of time spent with the patient. Most commonly used minimum intervention method is the 5 As which is ask, advise, assess, assist, and arrange.[5]

Except when contraindicated or in some demographics such as pregnancy, adolescence, light smokers or where there is little proof of success, all individuals who are attempting to quit smoking must be offered pharmacologic intervention. For smoking cessation, pharmacologic treatment should be given in addition to behavioural support. The transdermal nicotine patch, nicotine gum, nicotine lozenge, nicotine inhaler, nicotine nasal spray, bupropion sustained-release, and varenicline are the approved drugs for smoking cessation. Second line drugs may be provided to patients who do not react to any first-line medications or who have first-line agent contraindications. Clonidine and nortriptyline are second-line medications. Despite not having food and drug authority approval for smoking cessation, second-line medicines have shown some promise in the management of tobacco use. Patients who have not been able to stop using tobacco using monotherapy frequently receive pharmacologic medicines in combination therapy. Combination therapy involves combining longer-acting medications like the nicotine patch or bupropion SR with short-acting nicotine replacement therapy which include nicotine gum, lozenges, inhalers, or nasal spray.[6] The purpose of this research is to review the available information about pharmacological approach to smoking cessation and effective intervention models.

METHODOLOGY

This study is based on a comprehensive literature search conducted on 25 November 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information about advantages and pharmacological approach to smoking cessation and effective intervention models. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

Although different pharmacological treatments use different mechanisms, the fundamental goals are the same: to lessen the withdrawal and craving symptoms that are frequently linked to quitting attempts; to lessen the reward associated with smoking by indirectly disrupting dopamine release or by desensitizing receptors; and/or to provide some form of positive reinforcement other than a cigarette.[7] The general tenet of smoking cessation therapy is that cessation starts on the quit day and that it is not advisable to cut back before stopping. This is based on the nicotine addiction theory, which holds that because a user has reduced control over their drug use, it would be challenging for them to reduce their use or exercise any other form of control. According to the hypothesis of nicotine addiction, as cigarette use decreases, each cigarette will become more satisfying and difficult to give up, and the smoker will experience a loss of motivation, making it less likely that they will attempt to quit and succeed in quitting completely. Nicotine replacement therapy (NRT), which has been successfully used to counteract this impact in smokers who have opted to limit their smoking but are not yet ready to quit, or electronic cigarettes, are medications to minimize withdrawal.

Evidence from several literature studies suggests that smoking reduction is linked to future cessation, and this strategy may be especially appealing to individuals who find it difficult to quit, including those with mental health disorders or other substance misuse issues.[8]

NRT

The therapeutic use of drugs that include nicotine is the pharmacotherapy that has been most extensively researched and utilized to manage nicotine dependency and withdrawal. NRT medicines come in a variety of forms, including tablets, gum, transdermal patches, nasal sprays, and oral inhalers. A gradual, continuous release method of delivering nicotine is the transdermal patch. Acute dose nicotine products include gum, nasal spray, oral inhalers, and tablets. They offer immediate nicotine release along with both general and breakthrough desire alleviation. These products all have varying degrees of effectiveness and nicotine absorption rates. They work best when the consumer also receives concurrent cessation counselling, but they still work even without additional behavioural therapy. NRT might also act as a coping mechanism, which would diminish the appeal of cigarette products. Because none of the nicotine delivery methods that are currently available can duplicate the quick and intense levels of arterial nicotine that are attained when cigarette smoke is breathed, it does not entirely alleviate the withdrawal symptoms.[9] Available studies show that nicotine replacement therapy is a successful treatment for smokers who don't want to or can't attempt an abrupt quit and want to stop smoking for good. It is uncertain whether utilizing nicotine replacement medication without regular interaction would be as successful, as the majority of the evidence comes from trials with ongoing behavioural support and monitoring.[10]

The use of any of the commercially available NRT products, including gum, patches, nasal spray, inhalers, and sublingual pills and lozenges, can help smokers who are trying to quit smoking boost their success rates. Regardless of environment, NRTs raise the rate of quitting by 50% to 70%. The level of additional support that is given to the person seems to have little bearing on how well NRT intervention works. Even while it increases the likelihood of quitting, providing more intense levels of support is not necessary for NRT to be successful.[11] Similarly, Hartmann-Boyce et al concluded in their findings that all of the approved forms of NRT can assist persons who attempt to quit smoking maximize their chances of success, as per the strong evidence. Irrespective of the setting NRTs raise the rate of quitting by 50% to 60%, and additional study is very unlikely to modify confidence in the estimate of the effect.[12] However, contradictory to these Hajek et al concluded that electronic cigarettes were much more efficient than NRT in the setting of multisession therapy for smokers seeking aid.[13] Clinical trials in future shall assess the efficacy of NRT alone and in combination to generate more evidence-based results.

Bupropion

Smokers who do not want to utilize a nicotine-based medication or who have already tried and failed to stop using NRT may prefer this non-tricyclic antidepressant. The recommended dosage for quitting smoking is 150 mg once daily for three days, followed by 150 mg twice daily for 7 to 12 weeks. The attempt to stop using the drug is often made a week after beginning medication.[7] Leischow et al revealed in their findings that in the 300-mg bupropion sustained release group, the cotinine-confirmed quit rates were considerably greater when strong adherence was compared to low adherence. In this rigorously controlled study, adherence was high overall, although it was significantly lower among non-white patients. High rates of medication adherence are necessary for bupropion to be effective in helping adolescents stop smoking, although there were large variances in adherence that affected results.[14]

Results of a study by Schnoll et al showed that bupropion did not significantly affect abstinence when compared to a placebo. Compared to patients without depression symptoms, patients with symptoms reported considerably lower abstinence rates. Individuals with depression experienced a greater rise in abstinence rates from bupropion than participants without depression symptoms did. Bupropion, when compared to a placebo, reduced withdrawal symptoms in patients with depression symptoms and enhanced quality of life.[15] Howes et al reported in their findings that there is strong evidence that bupropion can help people stop smoking for good. However, bupropion also raises the incidence of side effects, such as psychiatric adverse effects, and there is strong evidence that those who take it are more likely to stop their medication than those who take a placebo. It may be just as effective as NRT and nortriptyline. The other antidepressants that have been evaluated for their ability to help people quit smoking have not been shown to do so with sufficient evidence, and when assessing tolerance and safety outcomes, it was frequently difficult to draw conclusions due to a lack of data. Further research comparing the effectiveness of bupropion to a placebo is unlikely to alter the interpretation of the impact due to the high degree of certainty in the evidence.[16]

Nortriptyline

A promising auxiliary treatment for quitting smoking is nortriptyline. More intense psychosocial therapy is beneficial for smokers who have a history of depression. The diagnosis and mood interact to forecast relapse. Nortriptyline reduces increases in negative affect after smoking cessation.[17] Nortriptyline is helpful in assisting highly motivated smokers to stop smoking when used in conjunction with weekly behavioural counselling. For people who cannot tolerate or do not benefit from bupropion, the medicine may be an option.[18] Prochazka et al concluded in their findings that transdermal nicotine and nortriptyline together enhanced the rate of quitting while

having minimal impact on withdrawal symptoms. For smokers who have not responded to conventional therapy, this combination may represent an option.[19] Similarly results of a randomized trial showed that compared to placebo, nortriptyline caused a higher short-term discontinuation rate. Additionally, there were notable yet modest decreases in withdrawal symptoms. Nortriptyline might signify a fresh treatment method for quitting smoking.[20]

Varenicline

Varenicline, a partial agonist of the nicotinic acetylcholine receptor, helps healthy smokers quit. In three randomized, double-blind, controlled studies, it outperformed bupropion and may be more effective than NRT. It is among the one of the recommended the first-line medications.[21] Results of a randomized clinical trial concluded that use of varenicline for 24 weeks compared to placebo considerably improved smoking cessation rates through 6 months of follow-up among smokers who were not ready or able to stop within the next month but were willing to cut back and try to quit within the next three months. For smokers whose demands are not met by clinical recommendations advocating abrupt smoking cessation, varenicline offers a therapeutic option.[22] Reus et al concluded that the effectiveness of varenicline was consistently greater at 12 weeks in two trials where patients were randomly assigned to receive either varenicline or bupropion this result maintained significance at 24 weeks in both trials, and up to 52 weeks in one research study. Few patients stopped receiving treatment because of nausea, a frequent side effect reported in clinical trials. Varenicline is a pleasant and helpful addition to the therapeutic choices for quitting smoking owing to its targeted mechanism of action, superior efficacy, and great tolerability.[23]

Cytisine

Currently available in 18 nations, cytisine has been in use since 1964. Oral intake has a high level of systemic bioavailability, and the typical plasma half-life is 4.8 hours. Cytisine an affordable drug has been shown to improve the likelihood of smoking cessation. The gastrointestinal symptoms associated with cytisine's adverse reactions are most usually described as being mild or moderate in severity.[24] Walker et al revealed that cytisine was proven to be superior to NRT in helping smokers quit smoking when accompanied with brief behavioural assistance, however it was linked to a higher frequency of self-reported unpleasant effects.[25] Similarly, Hajek et al. reported in their findings that when it comes to effectiveness, cytisine is on par with other currently approved therapies for smoking cessation. It is necessary to expedite the licensing of cytisine for smoking cessation due to its low cost and potential public health benefit.[26] Further research including population-based clinical trials are needed to assess the effectiveness of pharmacological intervention for smoking cessation in longer run and at large scale since the available literature studies are limited.

CONCLUSION

Smoking lowers both the quantity and quality of life. Every clinical setting, especially those involved in cardiovascular disease risk management and prevention, should include smoking cessation programs in practice. Everyone who wants to stop smoking should have access to the safe and efficient pharmaceutical method of quitting as only timely intervention can prevent the burden of smoking and its hazardous complications although clinician shall tailor the pharmacological intervention as per the patient's needs.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Alberg AJ. Cigarette smoking: health effects and control strategies. Drugs of today (Barcelona, Spain : 1998). 2008;44(12):895-904.
2. Mackenbach JP, Damhuis RA, Been JV. [The effects of smoking on health: growth of knowledge reveals even grimmer picture]. Nederlands tijdschrift voor geneeskunde. 2017;160:D869.
3. Jafari A, Rajabi A, Gholian-Aval M, Peyman N, Mahdizadeh M, Tehrani H. National, regional, and global prevalence of cigarette smoking among women/females in the general population: a systematic review and meta-analysis. Env Health Prev Med. 2021;26(1):5.
4. Giulietti F, Filipponi A, Rosettani G, Giordano P, Iacoacci C, Spannella F, et al. Pharmacological Approach to Smoking Cessation: An Updated Review for Daily Clinical Practice. High Blood Press Cardiovasc Prev. 2020;27(5):349-62.
5. Aubin HJ, Luquiens A, Berlin I. Pharmacotherapy for smoking cessation: pharmacological principles and clinical practice. Br J Clin Pharmacol. 2014;77(2):324-36.
6. Onor IO, Stirling DL, Williams SR, Bediako D, Borghol A, Harris MB, et al. Clinical Effects of Cigarette Smoking: Epidemiologic Impact and Review of Pharmacotherapy Options. Int J Environ Res Public Health. 2017;14(10).
7. Cahill K, Stevens S, Perera R, Lancaster T. Pharmacological interventions for smoking cessation: an overview and network meta-analysis. Cochrane Database Systemat Rev. 2013;2013(5):Cd009329.
8. Lindson N, Klemperer E, Hong B, Ordóñez-Mena JM, Aveyard P. Smoking reduction interventions for smoking cessation. Cochrane Database Systemat Rev. 2019;9(9):Cd013183.
9. Wadgave U, Nagesh L. Nicotine Replacement Therapy: An Overview. Int J Health Sci. 2016;10(3):425-35.

10. Moore D, Aveyard P, Connock M, Wang D, Fry-Smith A, Barton P. Effectiveness and safety of nicotine replacement therapy assisted reduction to stop smoking: systematic review and meta-analysis. BMJ (Clinical research ed). 2009;338:b1024.
11. Stead LF, Perera R, Bullen C, Mant D, Hartmann-Boyce J, Cahill K, et al. Nicotine replacement therapy for smoking cessation. Cochrane Database Systemat Rev. 2012;11:Cd000146.
12. Hartmann-Boyce J, Chepkin SC, Ye W, Bullen C, Lancaster T. Nicotine replacement therapy versus control for smoking cessation. Cochrane Database Systemat Rev. 2018;5(5):Cd000146.
13. Hajek P, Phillips-Waller A, Przulj D, Pesola F, Smith KM, Bisal N, et al. E-cigarettes compared with nicotine replacement therapy within the UK Stop Smoking Services: the TEC RCT. Health Technol Assessment (Winchester, England). 2019;23(43):1-82.
14. Leischow SJ, Muramoto ML, Matthews E, Floden LL, Grana RA. Adolescent Smoking Cessation With Bupropion: The Role of Adherence. Nicotine Tobacco Res. 2016;18(5):1202-5.
15. Schnoll RA, Martinez E, Tatum KL, Weber DM, Kuzla N, Glass M, et al. A bupropion smoking cessation clinical trial for cancer patients. Cancer Causes Control. 2010;21(6):811-20.
16. Howes S, Hartmann-Boyce J, Livingstone-Banks J, Hong B, Lindson N. Antidepressants for smoking cessation. Cochrane Database Systemat Rev. 2020;4(4):Cd000031.
17. Hall SM, Reus VI, Muñoz RF, et al. Nortriptyline and cognitive-behavioral therapy in the treatment of cigarette smoking. Arch General Psychiatry. 1998;55(8):683-90.
18. Dickerson LM, Carek PJ. Nortriptyline effective for smoking cessation. J Fam Pract. 2002;51(12):1008.
19. Prochazka AV, Kick S, Steinbrunn C, Miyoshi T, Fryer GE. A randomized trial of nortriptyline combined with transdermal nicotine for smoking cessation. Arch Int Med. 2004;164(20):2229-33.
20. Prochazka AV, Weaver MJ, Keller RT, Fryer GE, Licari PA, Lofaso D. A randomized trial of nortriptyline for smoking cessation. Arch Int Med. 1998;158(18):2035-9.
21. Rigotti NA, Pipe AL, Benowitz NL, Arteaga C, Garza D, Tonstad S. Efficacy and safety of varenicline for smoking cessation in patients with cardiovascular disease: a randomized trial. Circulation. 2010;121(2):221-9.
22. Ebbert JO, Hughes JR, West RJ, et al. Effect of varenicline on smoking cessation through smoking reduction: a randomized clinical trial. JAMA. 2015;313(7):687-94.
23. Reus VI, Obach RS, Coe JW, Faessel H, Rollema H, Watsky E, et al. Varenicline: new treatment with efficacy in smoking cessation. Drugs of today (Barcelona, Spain : 1998). 2007;43(2):65-75.
24. Tutka P, Vinnikov D, Courtney RJ, Benowitz NL. Cytisine for nicotine addiction treatment: a review of pharmacology, therapeutics and an update of clinical trial evidence for smoking cessation. Addiction (Abingdon, England). 2019;114(11):1951-69.
25. Walker N, Howe C, Glover M. Cytisine versus nicotine for smoking cessation. N Engl J Med. 2014;371(25):2353-62.
26. Hajek P, McRobbie H, Myers K. Efficacy of cytisine in helping smokers quit: systematic review and meta-analysis. Thorax. 2013;68(11):1037-42.

Cite this article as: Alzahrani HH, Alasmari YM, Almutairi NA, Aldajani SG, Alanazi FO, Alsadiq AA, et al. Pharmacological approach to smoking cessation and effective intervention models. Int J Community Med Public Health 2023;10:423-7.