Smoking as a risk factor for coronary heart disease (CHD): Contemporary insights into treatment strategies

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ABSTRACT: Smoking is a powerful risk factor for coronary heart disease, responsible for numerous deaths each year. This qualitative literature review provides contemporary knowledge regarding the relationship between CHD and smoking as well as an evaluation of current treatment approaches. An electronic search was carried out in databases such as PubMed, Scopus, and Science Direct to examine and assess academic material during the last 5 years. The results indicate that smoking is connected with CHD in patients with type 2 diabetes mellitus, especially in the female population. Also, there is an association with alcohol, body weight, and smokeless tobacco. Gender is also a crucial factor in the frequency of smoking, as heavy smokers need more time to lower the danger of CHD in comparison to current smokers. Modern treatment strategies place a lot of focus on pharmacotherapy and holistic treatments.

KEYWORDS: coronary heart disease; smoking; morbidity; holistic; treatments; pharmacotherapy

1. Introduction

Coronary heart disease (CHD), also known as ischemic heart disease (IHD) and coronary artery disease (CAD), is a type of heart disease caused when arteries are not in the position to deliver enough oxygen-rich blood to the muscle of the heart due to narrowing by plaque or blocking by clots (Atherosclerosis)[1]. Coronary artery disease is still the major cause of cardiovascular diseases (CVDs), as 2 out of 10 deaths are connected with CAD, which is anticipated to increase from 17.3 million in 2012 to 23.6 million by 2030[2].

Smoking is a powerful risk factor for CHD, responsible for more than 200,000 deaths each year, leading to an elevated risk of sudden death. Even electronic cigarette smoking can increase blood pressure, raising the risk of CHD. These risks become worse and worse, leading to hypertension, diabetes, hypercholesterolemia, and glucose intolerance, which display the synergistic impact of smoking. Smokers suffer from atherosclerosis, thromboangiitis obliterans, and abdominal aortic aneurism[3]. Active smoking and exposure to secondhand smoke (SHD) are responsible for more than 30% of CHD mortality in both genders, while female smokers are more affected by CHD by 25% in comparison with men with the same exposure to tobacco smoke. This female susceptibility appears to be connected with genes involved in thrombin signaling[4]. Tobacco smoke consists of more
than 7000 different chemicals, including carbon monoxide, tar, acetone, lead, nicotine, sulfur compounds, hydrogen cyanide, arsenic, formaldehyde, naphthalene, and butane. Carbon monoxide and nicotine have a great effect on the cardiovascular effects of smoking. Even nonsmokers who are exposed to secondhand smoke can die because of CHD[5].

It is of crucial importance for patients who are smokers and suffer from coronary heart disease to make smoking cessation their own life priority. In this way, healthcare providers could be better concentrated on their efforts to actively encourage and empower persons to succeed in their smoking cessation regularly via regular health check-ups, counseling, psychology, and proper medicines. Stopping smoking not only ameliorates the medical prognosis of CHD but also offers many health benefits, as it improves the general quality of patients’ lives as well as significantly diminishes the danger of premature death[4].

This review seeks to provide, first, a synthesis of modern knowledge with regard to the relationship between smoking and CHD and, second, an assessment of the efficacy of current treatment approaches.

Objectives:
- Review the contemporary insights into the relationship between CHD and smoking.
- Show the new treatment approaches today.
- Explain the effectiveness and impact of treatment approaches on the relationship between tobacco smoking and DHD.

2. Material and method

This qualitative literature review was carried out to demonstrate the seriousness of the association between CHD and tobacco smoking, and to inform about the current therapeutic approaches. An electronic search was conducted in databases including PubMed, Scopus, Science Direct, Emerald, and SSRN to examine and critically evaluate academic material and new types of therapy during the last 5 years. A full search strategy was developed and included a combination of keywords referred to published articles, such as: ‘cigarettes’, ‘coronary heart disease’, ‘morbidity’ and ‘arteries’. Included papers were written in English language with abstracts, bibliography, and keywords based on the relationship between CHD and tobacco smoking.

3. Results

Smoking was found to be associated with CHD to a greater extent in patients with type 2 diabetes mellitus (DM)[6]. Smoking as a serious risk factor is responsible for macrovascular as well as microvascular complications in both genders with DM. However, it seems that women are influenced more in comparison to men. This particular finding is very alarming, as it leads to excess mortality in females owing to the higher rate of CHD. Higher blood pressure and plasma lipid levels in female patients than in male patients with DM, probably due to female body mass, hormones, such as estrogens which affect the metabolism of nicotine, and secondhand smoke are the most significant reasons for female vulnerability[7].

The greater percentage of the danger of CHD (25%) that female smokers suffer in contrast to male smokers obviously proves the vulnerable nature of the female population regardless of any other cardiovascular risk factors that may be dealt with[4,8]. This finding is based on a meta-analysis of King[9] who stated that the pooled relative risk of smoking as opposed to nonsmoking for women compared to
men was 1.25. When the result was limited to fatal CHD events the excess risk for women smokers was 19%, which raised in fact by 2% for each year of follow-up study. There was no difference among geographical areas of Asia Pacific, North America, and Europe. Also, female smokers confronted a higher risk of CHD apart those from the 30–44 age group[9]. Even if CHD develops 7 to 10 years later in the female population compared to the male, it is still the main reason for adult female mortality over the age of 65[8,10,11].

Apart from the interaction of smoking and DM, the relationship between alcohol and smoking might also increase the risk for coronary heart disease. Binge drinking especially appears to be catastrophically connected with CHD, regardless of average consumption[12]. Furthermore, the consumption of 100 g of alcohol per week is linearly connected with a borderline elevation in CHD, when compared to those who consume between 0–25 g per week[13]. According to recent research, except for alcohol[14] depression, bipolar disorder, schizophrenia, and anxiety disorders are also common in patients with existing coronary heart disease who unwittingly put themselves in danger of losing their life earlier because of CHD[15–17].

The relation between CHD and smoking is also declared by the investigation of Mokhayeri et al.[18] into the effect of smoking on coronary heart disease, regarding body weight as a mediating parameter. Smoking 20 cigarettes each day compared with no smoking directly (not by weight) raised the risk of CHD by 1.91% and indirectly reduced the danger of CHD by 0.02% through weight change. The findings ascertained those changes in weight on account of smoking have no substantial mediating effect on CHD risk[18]. The danger of CHD is more than 25% bigger in females because of tobacco smoking in comparison to male smokers, regardless of any other cardiovascular risk factors that may be dealt with[4,8]. Smoking cessation decreases CVD risk quickly even among current smokers with pre-existing disease, making treating tobacco usage an urgent consideration for secondary CVD prevention. Among smokers with CHD, stopping smoking was connected with a 36% decrease in cardiovascular mortality for more than 2 years in comparison with continued smoking habit[19,20].

The odds of stopping cigarettes were 28% less for individuals who used electronic cigarettes (e-cigarettes) compared with those who did not prefer e-cigarettes. Any connection between e-cigarette usage with cigarette cessation did not particularly differ in studies regarding all smokers that usually make use of e-cigarettes (regardless of interest in stopping cigarette smoking) in comparison with studies of only smokers who were actually interested in stopping cigarette smoking. E-cigarettes have risen as an alternative in contrast to combustible cigarettes, which do not contain tobacco, and just heat a liquid and turn it into an aerosol (vapor). The connection between e-cigarettes and CVD is highly inconsistent and could be associated with the high prevalence of previous or present smoking among e-cigarette users on a daily basis[20,21].

Smokeless Tobacco has the benefit of evading exposure to the products of combustion (burning process), it exposes cigarette users to different amounts of nicotine and carcinogenic tobacco-specific nitrosamines (chemicals) and heavy metals[1]. The ratio of deadly CHD that can be ascribed to SLT, utilizing the worldwide estimate of relative risk is calculated at about 0.3%. The ratio of CHD deaths on account of using SLT is estimated to be 5% in Sweden, 0.14% in United States, and 0.77% in Southeast Asia. However, there was no statistically significant positive correlation between chewing tobacco and deadly congestive heart failure[21].
4. Discussion

Taking into consideration the above it can be concluded that gender is a crucial factor that affects the relationship between smoking and coronary heart disease\cite{9,22–25}.

Table 1 indicates the main reasons for initiating smoking nowadays. Social influence (43.4%), curiosity (24.3%), fashion (19.7%), as well as stress and personal problems (10.5%), explain why people choose to get addicted to nicotine irrespective of their current or future health issues that may confront\cite{25}.

<table>
<thead>
<tr>
<th>Table 1. The main reasons for initiating smoking nowadays.</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curiocity</td>
<td>Yes 37</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>No 114</td>
<td>75.0</td>
</tr>
<tr>
<td>Most of my friends were smoking</td>
<td>Yes 66</td>
<td>43.4</td>
</tr>
<tr>
<td></td>
<td>No 85</td>
<td>55.9</td>
</tr>
<tr>
<td>Stress and personal problems</td>
<td>Yes 16</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>No 135</td>
<td>88.8</td>
</tr>
<tr>
<td>It was fashion</td>
<td>Yes 30</td>
<td>19.7</td>
</tr>
<tr>
<td></td>
<td>No 121</td>
<td>79.6</td>
</tr>
</tbody>
</table>

Source: Darahani et al.\cite{25}.

However, ambiguous results with respect to weight\cite{18} suggest the necessity of further investigation of those factors that interact in the relationship between smoking and coronary heart disease. The hazards of CHD are higher in smokers in comparison with people who have never smoked and those who have stopped smoking recently. The CHD side effects of smoking could be serious enough for the health of patients. The necessary criteria for assessing the causal significance of the relationship between smoking and coronary heart disease are the intensity, consistency, peculiarity, precedence, and coherence of the developed association. The implementation of these criteria can be changed by knowledge of the accuracy that variables could be measured as well as the necessity and sufficiency of a factor or not\cite{26}.

One decade of human life is lost in current smokers compared to those individuals who have never smoked\cite{27}. Stopping smoking as early as possible indicates better survival advantages than quitting at a later time\cite{28}. Also, smoking cessation cannot decrease the danger of CHD mortality at once. Heavy smokers (20 pack-years) can lower the danger of CHD five years after they have stopped smoking tobacco in proportion to current smokers\cite{29,30}. In addition, an increased risk for type 2 diabetes post-cessation weight gain in males and females and premature menopause in women are serious health issues that should be promptly confronted when stopping smoking\cite{31,32}. In Wu et al.\cite{33} quit smoking was connected with a reduced danger in all-cause mortality, non-fatal myocardial infarction as well as stroke, and less angina. Therefore, a more holistic and comprehensive picture of the relationship between smoking and coronary heart disease is necessary, as the benefits of smoking cessation are profound in terms of development and recurrent coronary heart disease\cite{34,35}.

Nowadays, CHD is recognized as a psychosomatic disease. When negative emotions bring about fear, anxiety, hostility, stress, tension, and other emotional changes in patients, then the conduction velocity of the heart is influenced a lot leading afterward to CHD. Both psychological and social factors define the frequency of its development, occurrence, rehabilitation as well as prognosis. 55.3% of patients with coronary heart disease express negative psychology and poor self-concept\cite{36,37}.
Contemporary treatment strategies for smokers with CHD

Strategies for treating smokers with CHD include quitting smoking, which mainly relies on pharmacotherapy. Nicotine replacement therapy (NRT) which involves gum, patches, nasal sprays or inhalers, and lozenges could assist in managing successfully withdrawal symptoms. Also, the usage of varenicline is a more feasible and effective method in comparison to bupropion in order to strengthen the continuous abstinence rate (CAR)\textsuperscript{[38,39]}. Furthermore, cardiac rehabilitation (cardiac rehab) is a structured program that is based on adapting lifestyle and dietary changes, weight management, exercise, and quitting smoking. It is a personalized program to facilitate quality of life, relieve symptoms of heart problems, and prevent future heart problems\textsuperscript{[40]}. In the framework of medical management, the prescription of medications is important to handle other CHD risk factors, like diabetes, hypertension, or hyperlipidemia.

Aspirin therapy has proved really helpful against blood clots while decreasing the danger of additional cardiovascular events, owing to its antiplatelet effects\textsuperscript{[41]}. In addition, regular check-ups to monitor progress and manage any challenges that appear or to adjust treatment plans as needed in order to improve patients’ adherence are also necessary to provide appropriate intervention and prevent smoking relapse\textsuperscript{[41,42]}. The cognitive behavioral treatment (CBT) approach helps smokers with CHD to deprompt their minds, recognize their smoking triggers as well as high-risk situations to avoid, reframe negative thought patterns, and develop alternative but positive behaviors in order to manage cravings and fight in favor of smoking cessation\textsuperscript{[43]}.

A holistic approach considers a human being as a whole. Holistic treatment for smokers with CHD refers to mental, physical, and lifestyle factors that have a significant impact on their lives and well-being. At first, it involves mind-body practices, which are concentrated on mindfulness meditation and yoga. Both of them emphasize deep-breathing exercises which help to handle stress and promote relaxation\textsuperscript{[44]}. Regarding nutrition and dietary changes, nutritional counseling providing guidance and a heart-healthy diet are recommended emphasizing whole grains, low-fat dairy products, and lean proteins, apart from vegetables and fruit. In this way, CHD risk is diminished enough, especially in women (pre- and post-menopausal) smokers\textsuperscript{[45]}.

Herbal as well as integrative medicine can also play a great role in the fight against smoking habits. Passion flower in combination with anxiolytic valerian can assist in handling stress and insomnia, while acupuncture, mindfulness-based interventions (MBIs), and hypnosis are proved helpful on the condition that it is applied by a licensed and well-experienced practitioner\textsuperscript{[46]}. Additionally, it is very significant to identify any triggers, like social situations, that contribute to avoiding or postponing smoking cessation. A supportive work and home environment should also be encouraged for smokers with CHD in order to decrease relapses and increase tobacco smoking persistence\textsuperscript{[47]}. Moreover, taking part in behavioral interventions and support groups to share feelings and experiences is very encouraging and relieving, too\textsuperscript{[48]}.

5. Conclusion

Unfolding the perplexing relationship that takes place between smoking and CHD, it is obvious that smoking is a considerable risk element for cardiovascular health, which can become less extreme if public health interventions, tobacco cessation programs (including e-smoking), and campaigns for education could be coordinated to diminish this great danger. It is also of vital importance to adjust treatment strategies in accordance with the medical history, preferences, and current health conditions.
of smokers with CHD for the benefit of patients[49].

Effective smoking cessation interventions to confront CHD consequences are needed. To maximize the adoption of new health habits, the implementation of brief interventions that include encouragement, proper guidance, and strong advice to quit smoking or nicotine replacement therapy (NRT) for individuals with established CHD is extremely important in order to diminish the jeopardy of mortality and mental health comorbidity in current male and female smokers[50]. While decreasing the incidence of recurrent coronary heart disease via cholesterol-lowering medicines and therapies, quitting tobacco smoking plays a fundamental role in diminishing the danger of further CHD incidence in individuals diagnosed with CHD[51,52].

**Conflict of interest**

The authors claim no conflict of interest in the paper.

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