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THE EFFECT OF SMOKING ON ULCERATIVE COLITIS - A REVIEW ARTICLE

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ABSTRACT

Introduction Ulcerative colitis (UC) is an idiopathic, chronic inflammatory disorder of the colonic mucosa. It affects patients' health and quality of life, and can result in life-threatening complications, such as colon cancer. The aim of the study is to present current knowledge on the impact of cigarette smoking on the onset, course and treatment of ulcerative colitis.
Methodology The authors conducted a comprehensive search of the PubMed electronic database using the keywords. Duplicate studies were removed, and the remaining articles were assessed based on their title and abstract. A total of 20 studies met the inclusion criteria and were subjected to critical review, assessing the methodological design, sample characteristics, and the type and duration of follow-up of the population groups. The primary research for this article was conducted in July 2025.
Conclusion Compared with non-smokers, former smokers have a significantly higher risk of developing ulcerative colitis (UC), and this risk may be proportional to cumulative exposure to tobacco smoke. Based on the presented reports, we can conclude that any potential protective effect is small and observed only in men. The study results do not constitute a basis for justifying cigarette smoking. Combined with numerous other publications in various fields of medicine, primarily oncology and cardiovascular disease, this leads to one clear conclusion: it's best not to start smoking at all.

KEYWORDS

Ulcerative Colitis, Inflammatory Bowel Disease, Smoking, Tobacco

CITATION

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Introduction

Ulcerative colitis (UC) is an idiopathic, chronic inflammatory disorder of the colonic mucosa, which starts in the rectum and generally extends proximally in a continuous manner through part of colon. Patients with ulcerative colitis experience recurring inflammation and ulceration of the colon. The most common symptoms are abdominal pain, increased bowel movements and stools containing blood and mucus. [13] This disease affects patients' health and quality of life, and can result in life-threatening complications, such as colon cancer. The current focus of treatment is to control inflammation, alleviate symptoms, slow disease progression and improve quality of life. A variety of treatments are used, including pharmacological, nutritional and surgical. The pathogenesis of ulcerative colitis is not yet fully understood, but its development may be associated with genetic, immunological and environmental factors. [13] A significant increase in the incidence of inflammatory bowel disease (IBD) has been observed in recent years. This phenomenon is associated, in part, with environmental changes. One proven factor is cigarette smoking. [14] The association between ulcerative colitis and smoking was first described in 1982 by Harries et al. The researchers observed that the proportion of smokers among patients with UC was lower than in the healthy control group. [7] Since that time, a substantial number of clinical studies have corroborated the hypothesis that current smoking may act as a preventative measure against the development of ulcerative colitis. On the other hand, individuals who have quit smoking have an approximately 1.5 times higher risk of developing ulcerative colitis compared with those who have never smoked. [8] In the present publication, the state of the art regarding the impact of cigarette smoking on the development, course and treatment of ulcerative colitis will be presented.

Methodology

The authors conducted a comprehensive search of the PubMed electronic database using the keywords"Ulcerative colitis" AND ("smoking" OR"tobacco"). The search yielded 1383 results, which were reviewed for relevance. Duplicate studies were removed, and the remaining articles were assessed based on their title and abstract. A total of 20 studies met the inclusion criteria and were subjected to critical review, assessing the methodological design, sample characteristics, and the type and duration of follow-up of the population groups. The synthesis aimed to objectively assess the potential benefits and risks of cigarette smoking on the development, course of disease, and effectiveness of treatment for ulcerative colitis. The analysis included groups of patients who were both active smokers and former smokers. The primary research for this article was conducted in July 2025.

Results

The study by S. Park et al. involved a retrospective population-based cohort study of over 23 million adults in South Korea. Compared with non-smokers, the risk of developing UC was significantly lower in current smokers (aHR 0.92; 95% CI 0.87–0.98) and significantly higher in former smokers (aHR 1, 83; 95% CI 1, 73–1, 95). [14] The study also showed that the risk of developing UC among former smokers was significantly related to the amount and duration of smoking. Subpopulation analysis revealed that the preventive effect of current smoking on the development of UC was observed exclusively among males (aHR 0.90; 95% CI 0.84–0.96). [14]

In another large population-based study, L. Higuchi et al. analysis of two large, prospective cohort studies of women in which smoking information was obtained before the diagnoses of IBD. The study results indicated that current smoking was not significantly associated with the risk of UC (HR, 0.86; 95% CI, 0.61–1.20), but a significant increase in risk was observed in former smokers (HR, 1.56; 95% CI, 1.26–1.93). [8] Furthermore, the study found that among current smokers, there was no association between the number of cigarettes smoked per day and the risk of developing inflammatory bowel disease (IBD). [8]

A case-control study was also conducted by N. Abraham to assess the association between smoking history, previous surgery, and other potential causal factors and the development of UC. [1] The risks of developing UC were as follows for smokers 0.41 (CI 0.19-0.87), ex-smokers 3.45 (CI 1.62-7.35) and non-smokers 0.78 (CI 0.44-1.37). The study also showed that former smokers were at higher risk of developing the disease (OR = 3.00 (1.38–6.51)) compared to people who had never smoked. [1] The study results also show that over 50% of the former smokers' group developed symptoms within two years of quitting. In over 76% of all patients, the delay between symptom onset and diagnosis was less than a year. [1]

A Japanese case-control study [12] also confirmed that a history of smoking increases the risk of ulcerative colitis. Importantly, this study also found that passive smoking at home was significantly associated with an increased risk of developing ulcerative colitis in the group of non-smokers (1.90, CI:1.30–2.79). [12] Notably, the researchers observed that the location of the UC was not linked to active or passive smoking. [12]

Another noteworthy study is a retrospective cohort analysis of the impact of cigarette smoking on patients with IBD in the Hungarian population. Among UC patients, men were more likely to smoke at the time of diagnosis (19.6% vs. 9.7%, $p < 0.001$). Furthermore, disease progression was more advanced in smokers, particularly women. However, cigarette smoking was found to have no effect on the occurrence of fulminant episodes or the requirement for steroids or azathioprine (AZA). Interestingly, the fulminant course of the disease was most prevalent among non-smoking men. It is also worth noting that cigarette smoking did not affect the duration of the disease observed in either group. Additionally, active smoking among UC patients was found to reduce the likelihood of colectomy. [10] The study by Blackwell et al. is also relevant when discussing UC treatment. In a study of 6, 754 cases of ulcerative colitis, researchers observed no significant difference in the risk of severe UC exacerbation requiring corticosteroids, corticosteroid dependence, or the need for thiopurine use between smokers, former smokers, and nonsmokers. [4] The authors also note that they did not observe any differences in the frequency of colectomy depending on smoking status. [4] In contrast, Dias et al. published a meta-analysis examining the effect of smoking on colectomy rates for ulcerative colitis. They found that smoking reduced the risk of colectomy (OR 0.55, CI 0.33–0.91, P = 0.02). [6]

Some studies, such as those by S Reif et al., did not prove an association between smoking and ulcerative colitis in Israel. [16] In the context of smoking, studies have also been conducted examining the course of the disease after quitting. Beaugerie et al., in a case-control study, analyzed 32 patients with ulcerative colitis who quit smoking after diagnosis. Compared to non-smokers and those who continued smoking, they observed that

patients who quit smoking were more likely to have active disease, be hospitalized, and require treatment with steroids and immunomodulators. [2] Additionally, studies have assessed the effects of returning to smoking. Patients with ulcerative colitis who resumed smoking were at a higher risk of exacerbation, severe disease and complications such as bleeding and intestinal perforation than patients who continued to smoke. [20]

In the context of our discussion, a relevant study is the meta-analysis by Mahid et al., which focused exclusively on the impact of smoking on white, non-Jewish populations. [11] They found evidence that former smokers are more likely to suffer from ulcerative colitis than never smokers (OR, 1.79; 95% CI, 1.37-2.34). People who currently smoke were less likely to develop ulcerative colitis than people who didn't smoke (OR, 0.58; 95% CI, 0.45-0.75). [11]

Discussion

Despite numerous hypotheses about the simple protective effect of smoking on the development of ulcerative colitis, numerous studies have shown that quitting smoking before the onset of symptoms was associated with a significant increase in the risk of developing the disease. [1] Analyzing these data, the conclusion is that former smokers who are currently suffering from UC would be in a hypothetical”better situation" if they had never smoked. Evidence has been demonstrated that smoking has the capacity to exert an immunosuppressive effect. The manifestation of this phenomenon can be observed through a variety of indicators, including a diminished T4 to T8 lymphocyte expression ratio, a decline in IgG, IgM, and IgA immunoglobulin concentrations, and an increase in IgE levels. [3] It is conceivable that the cessation of smoking, and thus the cessation of its immunosuppressive effects, may serve as a catalyst for the onset of the disease in genetically predisposed individuals or result in the manifestation of previously masked symptoms and a delay in diagnosis.

The key chemical in cigarettes is nicotine. Recent studies have demonstrated that nicotine has the capacity to increase the thickness of the adherent mucus layer that is located on the surface of the colonic mucosa. In the case of ulcerative colitis, this layer is either absent or thin. [3] This may provide a rationale for the delayed onset of symptoms observed in active smokers. It has been suggested by studies in which transdermal nicotine was administered to non-smoking patients with mild to moderate UC despite mesalamine treatment that there may be a benefit in inducing clinical remission, although this is less than that seen with low-dose steroid therapy. In addition, it appears that nicotine was not as effective in maintaining remission as compared to the placebo. [15] [17] [18] An experiment was also undertaken using nicotine in a local form, i.e., a rectal enema. The study did not find evidence of treatment effectiveness. [9] At present, the use of nicotine in the treatment of ulcerative colitis is not a recognised medical practice. When analysing the effects of smoking, it is insufficient to consider only nicotine, as cigarettes are also associated with the formation of free radicals and carbon monoxide, which may play a role in the development of UC [5]. It is postulated that smoking has the capacity to exert an influence on the colonic mucus layer, to modify cytokine production, to modulate humoral and cellular immunity, to reduce intestinal smooth muscle tone and activity, to alter intestinal permeability, and to influence microcirculation within the colonic wall [1] [5] [19]

A review of the studies reveals a clear link between the number of cigarettes smoked, known as the dose, and the outcomes and natural history of CU. Patients who smoked more than a pack (20 cigarettes) per day were most likely to be diagnosed after the age of 40, which, according to numerous clinical observations, suggests a milder course. [4]

The studies we analyzed also had limitations. Although representative in terms of numbers, the cohorts consisted exclusively of female healthcare workers, [8] which may not represent the entire population or described populations with different prevalence and characteristics of addiction, such as in South Korea. [14] In the case of diseases such as IBD, where the prevalence varies geographically, this may affect the explication of the results to other populations. An illustration of this phenomenon can be observed in the findings of a study conducted within the Israeli population, which revealed an absence of correlation between smoking habits and the development of ulcerative colitis. [16] It can also be hypothesised that the observed effect was not statistically significant due to the genetic predisposition of the Israeli population to developing IBD. [16] Another limitation we observed is the limitation in cohort studies that took into account cigarette smoking among adolescents and young adults, in whom diagnosis is relatively common. Therefore, the findings discussed may not be generalizable to CU in younger age groups. It is important to note that the findings of this type of study are based on data collected using a self-assessment questionnaire and have not been verified by objective measurements. Furthermore, not all studies considered the time interval between when participants stopped smoking and completing the questionnaire. It should also be noted that the populations in

both the study and control groups were unaware of the research hypothesis when responding to the questionnaire. [12] Therefore, recall bias and the assessment of passive smoking exposure in places such as the workplace or public spaces must be taken into account. When comparing populations that are so culturally and temporally diverse, it is also important to consider that different countries have different legal and social norms that influence exposure to smoking or the likelihood of smoking.

Conclusions

Compared with non-smokers, former smokers have a significantly higher risk of developing ulcerative colitis (UC), and this risk may be proportional to cumulative exposure to tobacco smoke. Based on the presented reports, we can conclude that any potential protective effect is small and observed only in men. The study results do not constitute a basis for justifying cigarette smoking. Combined with numerous other publications in various fields of medicine, primarily oncology and cardiovascular disease, this leads to one clear conclusion: it's best not to start smoking at all.

REFERENCES

1. Abraham N., Selby W., et al. Is smoking an indirect risk factor for the development of ulcerative colitis? An age- and sex-matched case-control study. (2003) J Gastroenterol Hepatol Volume 18, 139-146.
2. Beaugerie L, Massot N, et al. Impact of cessation of smoking on the course of ulcerative colitis. (2001) Am J Gastroenterol. Volume 96(7): 2113-2116. DOI:10.1111/j.1572-0241.2001.03944.x.
3. Birtwistle J. The role of cigarettes and nicotine in the onset and treatment of ulcerative colitis. (1996) Postgrad. Med. J.; Volume 72: 714–718. DOI: 10.1136/pgmj.72.854.714.
4. Blackwell J, Saxena S, et al. The impact of smoking and smoking cessation on disease outcomes in ulcerative colitis: a nationwide population-based study. (2019) Aliment Pharmacol Ther. Volume 50(5):556-567. DOI:10.1111/apt.15390.
5. Cosnes J. Tobacco and IBD: relevance in the understanding of disease mechanisms and clinical practice. (2004) Best Pract Res Clin Gastroenterol Volume 18: 481-96.
6. Dias CC, Rodrigues PP, et al. Clinical predictors of colectomy in patients with ulcerative colitis: systematic review and meta-analysis of cohort studies. (2015) J Crohns Colitis. Volume 9(2):156-163. DOI:10.1093/ecco-jcc/jju016.
7. Harries AD, Baird A, Rhodes J. (1982) Non-smoking: a feature of ulcerative colitis. Br Med J (Clin Res Ed) Volume 284, 706. DOI:10.1136/bmj.284.6317.706.
8. Higuchi LM, Khalili H, et al. A prospective study of cigarette smoking and the risk of inflammatory bowel disease in women. (2012) Am J Gastroenterol. Volume 107(9), 1399-1406. DOI: 10.1038/ajg.2012.196.
9. Ingram JR, Thomas GA, et al. A randomized trial of nicotine enemas for active ulcerative colitis. (2005) Clin Gastroenterol Hepatol. Volume 3(11):1107-1114. DOI: 10.1016/s1542-3565(05)00849-9.
10. Lakatos PL, Vegh Z, et al. Is current smoking still an important environmental factor in inflammatory bowel diseases? Results from a population-based incident cohort. (2013) Inflamm Bowel Dis. Volume 19(5):1010-1017. DOI: 10.1097/MIB.0b013e3182802b3e.
11. Mahid SS, Minor KS, et al. Smoking and inflammatory bowel disease: a meta-analysis. (2006) Mayo Clin Proc. Volume 81(11):1462-1471. DOI:10.4065/81.11.1462. Erratum in: (2007) Mayo Clin Proc. Volume 82(7): 890.
12. Nishikawa A, Tanaka K, et al., Japan Ulcerative Colitis Study Group. Active and passive smoking and risk of ulcerative colitis: A case-control study in Japan. (2022) J Gastroenterol Hepatol. Volume 37(4) 653-659. DOI: 10.1111/jgh.15745.
13. Ordás I., Eckmann L., et al. (2012) Ulcerative colitis. The Lancet, Volume 380, (Issue 9853), 1606–1619. DOI: 10.1016/S0140-6736(12)60150-0.
14. Park S., Chun J. et al. (2019) Dose–response relationship between cigarette smoking and risk of ulcerative colitis: a nationwide population-based study. J Gastroenterol Volume 54, 881–890. DOI: https://doi.org/10.1007/s00535-019-01589-3.
15. Pullan RD., Rhodes J., et al. Transdermal nicotine for active ulcerative colitis. (1994) N Engl J Med. Volume 330(12):811-815. DOI:10.1056/NEJM199403243301202.
16. Reif S, Klein I, et al. Lack of association between smoking and inflammatory bowel disease in Jewish patients in Israel. (1995) Gastroenterology. Volume 108(6):1683-7. DOI: 10.1016/0016-5085(95)90129-9.
17. Thomas GA, Rhodes J, et al. Transdermal nicotine as maintenance therapy for ulcerative colitis. (1995) N Engl J Med. Volume 332(15): 988-992. DOI: 10.1056/NEJM199504133321503.
18. Thomas GA, Rhodes J, et al. Transdermal nicotine compared with oral prednisolone therapy for active ulcerative colitis. (1996) Eur J Gastroenterol Hepatol. Volume 8(8):769-776.
19. Thomas GA, Rhodes J, Ingram JR. Mechanisms of disease: nicotine - a review of its actions in the context of gastrointestinal disease. (2005) Nat Clin Pract Gastroenterol Hepatol Volume 2, 536–544.
20. Yokoyama Y, Yamakawa T, et al. Current Diagnostic and Therapeutic Approaches to Cytomegalovirus Infections in Ulcerative Colitis Patients Based on Clinical and Basic Research Data. (2020) Int J Mol Sci. Volume 21(7):2438. DOI:10.3390/ijms21072438.