The relationship and risk factors between Ulcerative Colitis and Cholelithiasis

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Abstract

Objective: *To explore the relationship and risk factors between ulcerative colitis (UC) and cholelithiasis.*

Methods: *A total of 250 UC patients who were admitted to the First Affiliated Hospital of Xinjiang Medical University from September 2019 to October 2023 and had abdominal imaging examinations were selected . According to the inclusion and exclusion criteria, a total of 247 UC patients were included. With the help of imaging examination, the patients were divided into two groups according to the presence or absence of gallstones, including 105 patients with UC with gallstones and 142 patients with UC without gallstones. General data analysis, blood routine and inflammatory factor analysis, biochemical index analysis, clinical symptoms and comorbidity analysis, and disease characteristics analysis were conducted on the two groups of research subjects respectively; single-factor and multi-factor logistic regression analysis were conducted to explore the risk factors of patients with UC combined with cholelithiasis.*

Results: *The majority of patients in the UC with gallstones group were 50-59 years old (39%), and the majority of patients in the UC without gallstones group were <39 years old (55%). Patients in the UC with gallstones group had a drinking history (21.0% vs 9.9%, P<0.05) was higher than that of the group without gallstones; both groups of patients had higher levels of red blood cells, monocytes, aspartate aminotransferase, alanine aminotransferase, creatinine, uric acid, cholesterol, high-density lipoprotein, and low-density lipoprotein. There was a statistically significant difference (P <0.05); the difference between the two groups of patients in nausea and vomiting (4.8% vs 54.4%, P <0.05) was statistically significant; the results of multivariate logistic regression analysis showed that monocytes, white blood cells and Protein, C-reactive protein, indirect bilirubin, and uric acid are independent risk factors.*

Conclusion: *In conclusion, our study explored the link between ulcerative colitis (UC) and cholelithiasis, revealing higher prevalence of drinking history in UC patients with gallstones. Elevated blood parameters and biochemical indices suggested potential mechanisms. Multivariate analysis identified monocytes, white blood cells, C-reactive protein, and uric acid as independent risk factors. These findings emphasize the importance of considering demographic and clinical factors in UC management, warranting further research for targeted interventions.*

Key words: *ulcerative colitis; cholelithiasis; association; risk factors*

Introduction

Ulcerative colitis (UC) and cholelithiasis represent significant gastrointestinal disorders with distinct pathophysiological profiles yet potentially intersecting epidemiological and clinical features. UC is a chronic inflammatory bowel disease characterized by inflammation and ulceration of the colon and rectum, leading to a spectrum of symptoms including abdominal pain, diarrhea, and rectal bleeding [1]. On the other hand, cholelithiasis, commonly known as gallstone disease, involves the formation of solid particles within the gallbladder or bile ducts, which can cause symptoms such as biliary colic, jaundice, and pancreatitis [2]. While traditionally viewed as separate entities, emerging evidence suggests possible connections between UC and cholelithiasis, prompting interest in exploring their relationship and shared risk factors. The gastrointestinal tract serves as a dynamic ecosystem influenced by complex interactions between genetic, environmental, and microbial factors, contributing to the pathogenesis of various disorders [3]. In this context, understanding the potential links between UC and cholelithiasis is essential for elucidating disease mechanisms, refining diagnostic strategies, and optimizing therapeutic approaches.

This comprehensive review aims to examine the existing literature on the relationship and risk factors between UC and cholelithiasis, providing insights into their pathophysiological connections and clinical implications. By synthesizing data from epidemiological studies, clinical observations, and mechanistic investigations, we seek to elucidate the complex interplay between these conditions and identify avenues for future research and clinical practice.

Epidemiological studies have provided valuable insights into the prevalence and incidence of UC and cholelithiasis, as well as their potential co-occurrence within populations. While UC predominantly affects young adults, with peak onset occurring in the second to fourth decades of life, cholelithiasis demonstrates a more diverse age distribution, with increasing prevalence among older individuals and those with specific risk factors such as obesity and metabolic syndrome [4,2]. Despite these differences, population-based studies have suggested a potential association between UC and cholelithiasis, with some reports indicating a higher prevalence of gallstones among UC patients compared to the general population [5]. Furthermore, geographical variations in the incidence and prevalence of UC and cholelithiasis have been observed, raising questions about the influence of environmental factors and genetic predisposition. For example, studies conducted in regions with a higher prevalence of UC, such as Western countries and certain Asian populations, have reported varying rates of cholelithiasis among UC patients, suggesting potential geographic clustering and shared etiological factors [6].

The clinical manifestations of UC and cholelithiasis can overlap, presenting diagnostic challenges and prompting investigations into potential mechanistic links between these conditions. While UC primarily affects the colonic mucosa, leading to inflammation and ulceration, cholelithiasis involves the formation of gallstones within the gallbladder or bile ducts, which can lead to biliary obstruction and associated complications [1,2]. Despite these anatomical differences, shared risk factors such as chronic inflammation, alterations in bile composition, and dysregulation of the gut microbiota have been implicated in the pathogenesis of both UC and cholelithiasis [3,6]. Chronic inflammation plays a central role in the development and progression of UC, contributing to mucosal damage and dysregulation of immune responses. Similarly, inflammatory processes have been implicated in the pathogenesis of cholelithiasis, with studies suggesting a potential role for pro-inflammatory cytokines, such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), in promoting gallstone formation and biliary stasis [7]. Moreover, alterations in bile composition, including changes in bile acids and cholesterol saturation, can predispose individuals to gallstone formation, highlighting the intricate interplay between bile metabolism and gastrointestinal physiology [2]. The gut microbiota, comprising trillions of microorganisms that inhabit the gastrointestinal tract, plays a critical role in maintaining host homeostasis and modulating immune responses. Dysbiosis, characterized by alterations in the composition and function of the gut microbiota, has been implicated in the pathogenesis of UC and cholelithiasis, with studies suggesting potential crosstalk between intestinal inflammation and biliary dysfunction [3]. Emerging evidence suggests that microbial dysbiosis may contribute to aberrant immune activation and mucosal inflammation in UC, while also influencing bile acid metabolism and gallstone formation in cholelithiasis [1]. This study focused on UC patients, analyzed the clinical characteristics of patients with cholelithiasis and those without cholelithiasis, and explored their risk factors.

Materials and methods

1.1 Research subjects were selected from 250 UC patients who were admitted to the First Affiliated Hospital of Xinjiang Medical University from September 2019 to October 2023 and had abdominal imaging examinations. The diagnosis of UC was in accordance with the "Chinese Guidelines for the Diagnosis and Treatment of Ulcerative Colitis".

Inclusion criteria**:** (1) Age >18 years old; (2) UC diagnosis complies with the "Chinese Ulcerative Colitis Diagnosis and Treatment Guidelines"; (3) Abdominal imaging examination (abdominal CT, abdominal ultrasound, MRCP) confirmed the presence of gallbladder stones, liver Patients with intralithiasis and common bile duct stones.

Exclusion criteria: (1) Incomplete medical records; (2) Patients with chronic wasting diseases such as tuberculosis and tumors, combined with chronic hepatitis (including viral, alcoholic, drug-related), and liver cirrhosis; (3) UC diagnosis Patients who have been previously diagnosed with cholelithiasis and underwent cholecystectomy; (4) Special groups, such as pregnant women, children, etc.;

1.2 Indicator testing collects the general clinical information of the research subjects, including age, gender, BMI, smoking history, drinking history, length of hospitalization, and number of hospitalizations. Collect blood routine and inflammatory factors, including red blood cells (RBC), white blood cells (WBC), neutrophils (Neu), lymphocytes (Lym), monocytes (Mono), platelets (PLT), hemoglobin (HGB), leukocytes Protein, erythrocyte sedimentation rate (ESR), C-reactive protein, procalcitonin. Collect biochemical indicators, including aspartate aminotransferase (AST), alanine aminotransferase (ALT), direct bilirubin (DBIL), indirect bilirubin (IBIL), total bilirubin (TBIL), creatinine (SCR), uric acid (UA)), urea (Urea), cholesterol (TC), triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL). Clinical symptoms were collected, including nausea and vomiting, abdominal pain and diarrhea, bloody and mucoid stools, tenesmus, and joint pain. Comorbidities were collected, including diabetes, hypertension, and coronary heart disease. The severity of UC is classified using the Truelove and Witts scoring standards, and the range of disease involvement is divided into E1, E2, and E3 according to the Montreal classification.

1.3 Observation indicators Compare the general information, blood routine and inflammatory factors, biochemical indicators, clinical symptoms and comorbidities, UC severity classification, and lesion involvement range of the two groups of subjects.

1.4 Statistical methods: SPSS 26.0 was used for statistical analysis. The measurement data consistent with normal distribution are expressed as mean ± standard deviation ($\bar{x}\pm s$); the measurement data with skewed distribution are expressed as median and quartile M (P25, P75), and the difference analysis between the two groups is selected. Non-parametric rank sum test, Pearson chi-square test was used between two groups . Single-factor and multi-factor logistic regression analysis were used to explore the risk factors for the occurrence of UC combined with cholelithiasis. The results were based on OR (95% CI), and $P<0.05$ was statistically significant.

Results

1.1 Comparison of general information of the two groups of research subjects: This study included a total of 247 research subjects. The differences in age, drinking history, and hospitalization times between the two groups of research subjects were statistically significant ($P<0.05$). The group with gallstones was dominated by women (50.5%), patients aged 50-59 years old (39%), and patients with a BMI of 18.5-24 kg/m2 (53.3%). The group without gallstones was mainly male (57%), the main group was patients under 39 years old (55%), and the main group was patients with a BMI of 18.5-24 kg/m2 (54.2%). There were more patients with a history of smoking (23.8% vs 14.8%) and drinking (21% vs 10.6%) in the cholelithiasis group than in the non-cholelithiasis group.

1.2 Comparison of blood routine and inflammatory factors between the two groups of study subjects: The differences in red blood cells and monocytes between the cholelithiasis group and the non-cholelithiasis group were statistically significant ($P< 0.05$). There were no statistically significant differences in blood routine indicators between the cholelithiasis group and the non-cholelithiasis group in ESR, C-reactive protein, and procalcitonin ($P> 0.05$).

1.3 Comparison of biochemical indicators between the two groups of study subjects: There were statistically significant differences in AST, ALT, SCR, UA, TC, HDL, and LDL between the cholelithiasis group and the group without gallstones ($P < 0.05$)

1.4 Comparison of clinical symptoms and comorbidities between the two groups of study subjects: There was a statistically significant difference in nausea and vomiting between the cholelithiasis group and the group without gallstones ($P <0.05$). There was no statistically significant difference in diabetes, hypertension, and coronary heart disease ($P> 0.05$).

1.5 Analysis of disease characteristics of the two groups of study subjects: The disease severity in the cholelithiasis group was mainly mild, followed by moderate. The cholelithiasis group accounted for 29.5 % and 28.6 % respectively , and the uncombined group accounted for 27.2 % and 28.6 % respectively . The lesions in both groups were mainly E3, that is, lesions of the whole colon, accounting for 37.1 % and 48.3 % in the two

groups respectively . A chi-square test was performed on the scope of lesions and disease stages, and there was no statistical difference (P>0.05).

Logistic regression analysis of influencing factors of UC patients with cholelithiasis takes whether UC patients have cholelithiasis as the dependent variable (assignment: yes = 1, no = 2), and the above data are included as independent variables in single-factor logistic regression. The results show that as the As the age and number of hospitalizations of patients with ulcerative colitis increased, the incidence of cholelithiasis also increased (P <0.05); with the increase of RBC, Lym, Neu, albumin, C-reactive protein, ALT, IBIL, TBIL, SCR , UA , and LDL increase , the risk of cholelithiasis increases (P <0.05); with the increase in clinical symptoms of mucus, pus, and blood in the stool , the risk of cholelithiasis increases (P <0.05) . It is statistically significant in single-factor regression analysis Multifactor logistic regression analysis was performed on the differential indicators, and the results showed that Neu, albumin, C-reactive protein, IBIL, and UA were independent risk factors (P<0.05).

Table 1 Analysis of general data of patients in the gallstone group and the group without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
age	49.35±9.186	39.58±11.235	0
age group			
<39 years old	16 (15.2%)	78(54.9%)	
40-49 years old	35 (33.3%)	35(24.6%)	
50-59 years old	41 (39.0%)	23(16.2%)	
60-69 years old	13 (12.4%)	5(3.5%)	
＞70 years old	0(0%)	1(0.7%)	
gender			0.227
male	51 (48.6%)	80(56.3%)	
female	54(51.4%)	62 (43.7%)	
BMI	22.79±3.505	22.16±3.747	0.853
BMI rating			
BMI<18.5 kg/m2	14 (13.3%)	23(16.2%)	
BMI = 18.5-24kg/ m2	56 (53.3%)	77(54.2%)	
BMI= 24-28kg/m 2	27(25.7%)	34(23.9%)	
BMI >28kg/ m2	8(7.6%)	8(5.6%)	
smoking			0.5
none	80 (76.2%)	122 (85.9%)	
have	25 (23.8 %)	20 (14.1%)	
drinking			0.015
none	83 (79.0%)	128 (90.1%)	
have	22 (21.0%)	14 (9.9%)	
The number of days in hospital	6(4,10)	7(4,13)	0.581
Number of hospitalizations	1(1,2)	2(1,4)	0.018

Note: According to the " Guidelines for Primary Diagnosis and Treatment of Obesity " designated by the Chinese Medical Association in 2019 : BMI <18.5 kg/m^2 is the weight.

Underweight, BMI 18.5-24kg/m^2 is the normal weight range , BMI 24-28 kg/m^2 is overweight, BMI > 28 kg/m^2 is obese.

Table 2 Analysis of blood routine indicators in patients with gallstones and those without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
red blood cells	4.75 (4.56, 5.01)	4.55 (4.1075, 4.8900)	0
leukocyte	6.05 (5.04, 7.82)	6.36(5.17,7.50)	0.779
neutrophils	3.72 (2.92, 5.58)	4.14 (3.33, 5.83)	0.091
Lymphocytes	1.88 (1.40, 2.26)	1.82 (1.38, 2.29)	0.779
monocytes	0.50 (0.39, 0.63)	0.56 (0.40, 0.74)	0.031
platelets	300.00 (243.50, 350.50)	305.00 (247.00, 389.75)	0.250
hemoglobin	124.00 (109.50, 141.50)	127.50 (104.25, 145.75)	0.663
albumin	39.60 (34.23, 42.22)	40.25 (36.15, 43.60)	0.081

Table 3 Analysis of inflammatory factor indicators in patients with gallstones and those without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
ESR（mm/h）	20.0 (12.0, 41.0)	22.0 (14.0, 34.0)	0.462
C-reactive protein (mg/L)	6.90 (5.00, 13.40)	9.13(5,00,19.65)	0.188
Procalcitonin(ng/L)	0.03 (0.02, 0.06)	0.03 (0.02, 0.06)	0.569

Table 4 biochemical indicators of patients in the gallstone group and the group without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
aspartate aminotransferase	35.7 (29.8, 39.7)	27.3 (22.93, 32.13)	0

alanine aminotransferase	30.7 (25.6, 34.6)	23.25 (19.23, 28.70)	0
Direct bilirubin	0.3 (0.3, 0.3)	0.3 (0.3, 0.3)	0.297
Indirect bilirubin	6.9 (3.9, 9.95)	6.7 (4.48, 10.1)	0.806
total bilirubin	11.8 (8.95, 15.5)	10.8 (8.2, 15)	0.23
Creatinine	59.3 (50.7, 68.3)	64.45 (52.83, 74.35)	0.04
uric acid	249 (207.2, 307.8)	282.75 (218.95, 341.3)	0.01
Urea	4.5 (3.5, 5.2)	4.4 (3.3, 5.5)	0.603
cholesterol	4.2 (3.6, 5.0)	3.80 (3.18, 4.53)	0.004
Triglycerides	1.3 (0.9, 1.8)	1.2 (0.9, 2)	0.622
HDL	1.0 (0.8, 1.2)	0.85 (0.7, 1.1)	0.014
Low-density lipoprotein	2.5 (2.1, 3.1)	2.3 (1.9, 2.8)	0.044

Table 5 Analysis of clinical symptoms of patients in the gallstone group and the group without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
feel sick and vomit	5(4.8%)	8(54.4%)	0.042
Abdominal pain and diarrhea	93 (88.6%)	132 (89.8%)	0.232
Mucus, pus and bloody stool	65(61.9%)	87(59.2%)	0.919
tenesmus	14 (13.3%)	22 (15%)	0.635
joint pain	2(1.9%)	9 (6.1%)	0.096

Table 6 Analysis of comorbidities in patients with gallstones and those without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
diabetes	2(1.9%)	5(3.4%)	0.45
hypertension	7(6.7%)	8(5.4%)	0.737
coronary heart disease	1(0.9%)	2(1.3%)	0.747

Table 7 Analysis of disease characteristics of patients in the gallstone group and the group without gallstones

project	UC combined with cholelithiasis group (n=105)	UC without cholelithiasis group (n=147)	P
Range of lesions			0.097
E1	30 (28.6%)	37 (25.2%)	
E2	36 (34.3%)	34 (23.1%)	
E3	39 (37.1%)	71 (48.3%)	
installment			0.986
remission period	20(19%)	29 (19.7%)	
Mild	31 (29.5%)	40 (27.2%)	
Moderate	30 (28.6%)	42 (28.6%)	
Severe	24 (22.9%)	31 (21.1%)	

Table 8 Univariate logistic regression analysis of risk factors for cholelithiasis

variable	B value	SE	Wald value	OR value (95%CI)	P value
gender	3.208	1.56	4.21	24.7 (1.16, 529.4)	0.04
age	-0.30	0.095	10.06	0.739 (0.61, 0.89)	0.002
BMI	-0.1 _	0.2	0.23	0.909 (0.61, 1.35)	0.63
Number of hospitalizations	1.79	0.66	7.37	6.01 (1.65, 21.96)	0.007
The number of days in hospital	-0.2 5	0.13	3.61	0.78 (0.61, 1.01)	0.0 6

red blood cells	-7.4 9	2.17	11.79	0.001 (0.00, 0.041)	0.001
leukocyte	-0.1 5	0.96	0.023	0.86 (0.13, 5.67)	0.8 8
neutrophils	2.18	1.10	3.73	8.40 (0.97, 72.89)	0.05 3
Lymphocytes	1.15	0.59	3.87	3.17 (1.004, 10.01)	0.0 49
monocytes	6.27	3.2	3.84	528.78 (0.99, 281181.29)	0.05
platelets	-0.0 1	0.0 1	1.8 _	0.99 (0.98, 1.00)	0.18
hemoglobin	0.03	0.46	0.48	1.03 (0.94, 1.13)	0.4 9
albumin	0.23	0.11	4.24	1.26 (1.01, 1.57)	0.0 4
ESR（mm/h）	-0.05	0.05	1.24	0.95(0.87,1.04)	0.2 7
C-reactive protein (mg/L)	0.10	0.04	7.06	1.11(1.03,1.19)	0.008
Procalcitonin(ng/L)	1.66	6.96	0.06	6.27 (0.4457452.07)	0.81
alanine aminotransferase	-1.21	0.38	10.38	0.298 (0.14, 0.62)	0.001
aspartate aminotransferase	0.1 _	0.11	0.78	1.10 (0.89, 1.36)	0.3 8
Direct bilirubin	0.41	0.51	0.62	1.5 (0.55, 4.11)	0.43
Indirect bilirubin	2.20	0.72	9.46	9.05 (2.22, 36.80)	0.002
total bilirubin	-2.13	0.67	10.10	0.12 (0.32, 0.44)	0.001
Creatinine	0.1 3	0.06	4.89	1.14 (1.02, 1.28)	0.0 3
uric acid	0.03	0.01	7.59	1,03(1.01,1.06)	0.0 1
Urea	-0.5 2	0.43	1.48	0.6 (0.26, 1.38)	0.22
cholesterol	-6.5 8	2.53	6.78	0.001 (0.00, 0.2)	0.1 _
Triglycerides	0.6 4	0.78	0.67	1.89 (0.41, 8.63)	0.41
HDL	2.08	2.32	0.80	7.99 (0.09.755.17)	0.37
Low-density lipoprotein	6.2 7	2.78	5.07	527.64 (2.26, 123445, 17)	0.02
feel sick and vomit	-2.1 3	2.62	0.66	0.12 (0.001, 20.42)	0.42
Abdominal pain and diarrhea	2.62	1.95	1.82	0.18 (13.78, 0.30)	0.1 8
Mucus, pus and bloody stool	-3.98	1.66	5.77	0.02 (0.001, 0.48)	0.0 2
tenesmus	-1.86	1.45	1.66	0.16 (0.01, 2.65)	0.2 _
joint pain	-1.63	7.66	0.05	0.2 (0.0, 648615.53)	0.83

diabetes	-3.35 _	3.46	0.94	0.35 (0.0, 31.03)	0.33
hypertension	3.7 3	2.73	1.87	41.48 (0.2, 8691.07)	0.17
coronary heart disease	-0.6	3.82	0.03	0.55 (0.0, 985.33)	0.8 8
Smoking history	-3.75	2.36	2.54	0.024 (0.0, 2.37)	0.11
drinking history	-2.10	2.14	0.97	0.122 (0.002, 8.078)	0.3 3

Table 9 Logistic regression multi-factor analysis results of different severity levels

variable	B value	SE	Wald value	OR value (95%CI)	P value
gender	0.44	0.57	0.6	1.52 (0.51, 4.71)	0.438
age	-0.1	0.02	21.93	0.9 (0.86, 0.94)	0.00 _
Number of hospitalizations	0.02	0.04	0.26	1.02 (0.95, 1.1)	0.61
red blood cells	-1.95	0.51	14.64	0.14 (0.52, 0.39)	0.00 _
Lymphocytes	0.07	0.27	0.07	1.08 (0.64, 1.82)	0.787
monocytes	3.16	1.11	8.07	23.56 (2.66, 208.57)	0.005
albumin	0.12	0.04	7.62	1.12 (1.03, 1.22)	0.006
C-reactive protein (mg/L)	0.03	0.01	4.71	1.03 (1.00, 1.05)	0.03
alanine aminotransferase	-0.3	0.05	39.38	0.74 (0.68, 0.81)	0.00 _
Indirect bilirubin	0.48	0.14	12.42	1.62 (1.24, 2.12)	0.00 _
total bilirubin	-0.47	0.13	13.43	0.63 (0.49, 0.81)	0.00 _
Creatinine	0.03	0.02	2.11	1.03 (0.99, 1.07)	0.15
uric acid	0.01	0.003	5.08	1.01(1.00,1.01)	0.024
cholesterol	-1.17	0.53	4.81	0.31(0.11,0.88)	0.028
Low-density lipoprotein	1.04	0.69	2.23	2.82 (0.72, 10.97)	0.14
Mucus, pus and bloody stool	-0.32	0.44	0.52	0.73（0.3，1.73）	0.47

Discussion

Ulcerative colitis (UC) and cholelithiasis are two distinct gastrointestinal disorders, yet there appears to be a potential association between them, as evidenced by various epidemiological and clinical studies [8]. Our study aimed to delve deeper into this relationship and identify potential risk factors contributing to the co-occurrence of these conditions.

The findings from our study revealed several noteworthy observations. Firstly, the majority of UC patients with cholelithiasis belonged to the 50-59 age group, while those without gallstones were predominantly younger, with a majority under 39 years old. This age distribution aligns with previous studies indicating an increased prevalence of cholelithiasis with advancing age, particularly after the age of 40, attributed to age-related changes in bile composition and metabolism [9]. The discrepancy in age distribution between the two groups suggests a potential age-related susceptibility to cholelithiasis among UC patients.

Moreover, our study identified a significant association between a history of alcohol consumption and the presence of gallstones in UC patients. Alcohol consumption has been implicated as a risk factor for cholelithiasis due to its influence on bile composition and secretion [10]. The higher prevalence of alcohol consumption among UC patients with cholelithiasis underscores the importance of lifestyle factors in the development of gallstones, especially in susceptible populations. In terms of laboratory findings, UC patients

with cholelithiasis exhibited elevated levels of various biochemical parameters compared to those without gallstones, including red blood cells, monocytes, liver enzymes (aspartate aminotransferase and alanine aminotransferase), creatinine, uric acid, and lipids. These findings suggest a potential systemic inflammatory response and metabolic dysregulation associated with the co-occurrence of UC and cholelithiasis. Indeed, chronic inflammation, a hallmark of UC, has been implicated in the pathogenesis of cholelithiasis by promoting alterations in bile composition and gallbladder motility [11].

Clinical symptoms analysis revealed a significant difference in the prevalence of nausea and vomiting between UC patients with and without cholelithiasis, highlighting the potential impact of gallstone-related complications on gastrointestinal symptoms in UC patients [12]. The presence of gallstones may exacerbate existing gastrointestinal symptoms in UC patients, posing diagnostic and therapeutic challenges [13]. Multivariate logistic regression analysis identified several independent risk factors for the development of cholelithiasis in UC patients, including elevated levels of monocytes, white blood cells, protein, C-reactive protein, indirect bilirubin, and uric acid. These findings underscore the complex interplay between systemic inflammation, metabolic factors, and biliary dysfunction in the pathogenesis of cholelithiasis in the context of UC [14].

Multivariate logistic regression analysis identified several independent risk factors for the development of cholelithiasis in UC patients, including elevated levels of monocytes, white blood cells, protein, C-reactive protein, indirect bilirubin, and uric acid. These findings underscore the complex interplay between systemic inflammation, metabolic factors, and biliary dysfunction in the pathogenesis of cholelithiasis in the context of UC [15].

Chronic inflammation plays a central role in both UC and the pathogenesis of cholelithiasis. In UC, ongoing inflammation in the gastrointestinal tract leads to alterations in the enterohepatic circulation of bile acids and the composition of bile, predisposing individuals to gallstone formation [16]. Inflammatory mediators, such as interleukins and tumor necrosis factor-alpha (TNF-alpha), may also directly impact gallbladder motility and bile secretion, contributing to the development of gallstones [17]. Genetic predisposition may also contribute to the development of both UC and cholelithiasis. Genome-wide association studies (GWAS) have identified several genetic variants associated with an increased risk of UC, including genes involved in immune regulation and inflammatory pathways [18]. Lifestyle factors, such as diet, obesity, and alcohol consumption, contribute to the development of both UC and cholelithiasis. High-fat diets, low in fiber and rich in cholesterol, promote cholesterol supersaturation in bile, increasing the risk of gallstone formation [19]. Advancing age is a well-established risk factor for both UC and cholelithiasis. The incidence of cholelithiasis increases with age, particularly after the age of 40, attributed to age-related changes in bile composition and metabolism [20]. Similarly, UC is more commonly diagnosed in young to middle-aged adults, with a second peak in incidence observed in older individuals [21]. Cigarette smoking is a well-established risk factor for the development and exacerbation of UC [22]. In contrast, smoking has been associated with a reduced risk of cholelithiasis, possibly due to its effects on bile composition and gallbladder motility [23]. However, the impact of smoking on the risk of cholelithiasis in UC patients remains unclear and warrants further investigation. Certain medications used in the treatment of UC may influence the risk of cholelithiasis. For example, corticosteroids, commonly prescribed to induce remission in UC patients, can lead to metabolic disturbances, including hyperlipidemia and insulin resistance, predisposing individuals to gallstone formation [24]. Similarly, immunomodulators such as thiopurines and biologic agents may alter hepatic metabolism and bile acid synthesis, potentially impacting gallstone risk [25].

The relationship between UC and cholelithiasis involves complex interactions between inflammation, bile acid metabolism, genetic predisposition, lifestyle factors, and medication effects. Recognizing and addressing these mechanisms and risk factors are essential for understanding the pathogenesis of gallstone formation in UC patients and optimizing management strategies for this population.

Conclusion

In conclusion, our study investigated the relationship and risk factors between ulcerative colitis (UC) and cholelithiasis, shedding light on the complex interplay between these two conditions. Our findings underscore the importance of considering age, drinking history, and various biochemical markers, including monocytes, white blood cells, C-reactive protein, and uric acid, in assessing the risk of cholelithiasis in UC patients. Additionally, our study highlights the potential impact of gallstone-related complications on gastrointestinal symptoms, emphasizing the need for vigilant monitoring and tailored management strategies in this patient population. Moving forward, further research is warranted to elucidate the underlying mechanisms driving the association between UC and cholelithiasis, ultimately informing more targeted interventions and improving patient outcomes.

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