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COMPARATIVE STUDY OF INTESTINAL MICROFLORA AND INFLAMMATORY INDICATORS IN PATIENTS WITH AND WITHOUT COVID-19 TRANSMISSION AND PATHOLOGICAL CHANGES IN THE GASTRO-INTESTINAL SYSTEM

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ABOUT ARTICLE

Abstract: This study investigates the differences in intestinal microflora and inflammatory indicators between patients with and without COVID-19, focusing on those with pathological changes in the gastrointestinal (GI) system. The COVID-19 pandemic has highlighted the importance of understanding how the virus affects various bodily systems, including the GI tract. Our comparative analysis included patients diagnosed with COVID-19 and experiencing GI symptoms, alongside a control group of individuals without COVID-19. We assessed the composition of intestinal microflora and measured specific inflammatory markers. The results indicate significant alterations in the gut microbiome and elevated inflammatory indicators in COVID-19 patients, suggesting a potential link between the virus and GI pathology. These findings could contribute to better understanding and managing GI complications in COVID-19 patients.

COVID-19 УТКАЗГАН ВА УТКАЗМАГАН ОЩОКОН - ИЧАК ТИЗИМИДА ПАТОЛОГИК УЗГАРИШЛАР АНИКЛАНГАН БЕМОРЛАРДА ИЧАКЛАР МИКРОФЛОРАСИНИ ХАМДА ЯЛЛИГЛАНИШ КУРСАТКИЧЛАРИНИ СОЛИШТИРМА УРГАНИШ

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МАҚОЛА ҲАҚИДА

Аннотация: Ушбу тадқиқот ошқозон-ичак (ГИ) тизимида патологик ўзгаришлар бўлган беморларга эътибор қаратиб, СОВИД-19 билан касалланган ва бўлмаган беморлар ўртасидаги ичак микрофлораси ва яллиғланиш кўрсаткичларидаги фарқларни ўрганади. СОВИД-19 пандемияси вируснинг турли тана тизимларига, шу жумладан ошқозон-ичак трактига қандай таъсир қилишини тушуниш муҳимлигини таъкидлади. Бизнинг қиёсий таҳлилимиз СОВИД-19 ташхиси қўйилган ва ГИ белгиларини бошдан кечирган беморларни, шунингдек, СОВИД-19 бўлмаган шахсларнинг назорат гуруҳини ўз ичига олди. Биз ичак микрофлорасининг таркибини баҳоладик ва ўзига хос яллиғланиш белгиларини ўлчадик. Натижалар ичак микробиомасида сезиларли ўзгаришларни ва СОВИД-19 беморларида яллиғланиш кўрсаткичларининг ошишини кўрсатади, бу вирус ва ГИ патологияси ўртасидаги потенциал боғлиқликни кўрсатади. Ушбу топилмалар СОВИД-19 беморларида ГИ асоратларини яхшироқ тушуниш ва бошқаришга ёрдам бериши мумкин.

СРАВНИТЕЛЬНОЕ ИССЛЕДОВАНИЕ МИКРОФЛОРЫ КИШЕЧНИКА И ВОСПАЛИТЕЛЬНЫХ ПОКАЗАТЕЛЕЙ У ПАЦИЕНТОВ С ТРАНСМИССИВНОСТЬЮ И БЕЗ ПЕРЕДАЧИ COVID-19 И ПАТОЛОГИЧЕСКИМИ ИЗМЕНЕНИЯМИ В ЖЕЛУДОЧНО-КИШЕЧНОЙ СИСТЕМЕ

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О СТАТЬЕ

Аннотация: В этом исследовании изучаются различия в кишечной микрофлоре и показателях воспаления между пациентами с COVID-19 и без него, уделяя особое внимание пациентам с патологическими изменениями в желудочно-кишечной системе (ЖКТ). Пандемия COVID-19 подчеркнула важность понимания того, как вирус влияет на различные системы организма, включая ЖКТ. Наш сравнительный анализ включал

пациентов с диагнозом COVID-19 и испытывающих симптомы ЖКТ, а также контрольную группу лиц без COVID-19. Мы оценили состав кишечной микрофлоры и измерили специфические маркеры воспаления. Результаты указывают на значительные изменения в микробиоме кишечника и повышенные показатели воспаления у пациентов с COVID-19, что предполагает потенциальную связь между вирусом и патологией ЖКТ. Эти результаты могут способствовать лучшему пониманию и лечению осложнений ЖКТ у пациентов с COVID-19.

INTRODUCTION

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has presented multifaceted challenges to global health, revealing a wide spectrum of clinical manifestations beyond the primary respiratory symptoms. Among these, gastrointestinal (GI) symptoms such as diarrhea, nausea, and abdominal pain have emerged as significant concerns, affecting a considerable subset of COVID-19 patients. This raises critical questions about the virus's impact on the gastrointestinal system and the underlying mechanisms driving these symptoms.

Recent studies suggest that SARS-CoV-2 can directly infect the gastrointestinal tract, given the abundant expression of angiotensin-converting enzyme 2 (ACE2) receptors, which the virus utilizes for cell entry. This viral infiltration may disrupt the balance of intestinal microflora, leading to dysbiosis and exacerbating inflammatory responses within the GI tract. Understanding these interactions is crucial for developing targeted therapeutic strategies and improving clinical outcomes for patients with COVID-19-related GI symptoms.

In this comparative study, we aim to investigate the differences in intestinal microflora and inflammatory indicators between patients with and without COVID-19, focusing specifically on those with pathological changes in the gastrointestinal system. By analyzing the gut microbiome composition and measuring specific inflammatory markers, we seek to elucidate the potential links between SARS-CoV-2 infection, gut dysbiosis, and GI inflammation. Our findings will contribute to a deeper understanding of the pathophysiological mechanisms underlying COVID-19 and its gastrointestinal manifestations, potentially guiding future interventions and management strategies for affected patients.

THE MAIN RESULTS AND FINDINGS

The gastrointestinal (GI) manifestations of COVID-19 have garnered considerable attention since the onset of the pandemic. While respiratory symptoms remain the hallmark of the disease, a substantial number of COVID-19 patients exhibit GI symptoms such as diarrhea, nausea,

vomiting, and abdominal pain. These symptoms often correlate with more severe disease outcomes and prolonged recovery times.

1. Intestinal Microflora and COVID-19:

The human gut microbiome plays a crucial role in maintaining overall health, including immune modulation and pathogen defense. Dysbiosis, or the imbalance of gut microbiota, has been implicated in various diseases, including inflammatory bowel disease, obesity, and metabolic syndrome. Emerging research suggests that SARS-CoV-2 infection can induce significant alterations in the gut microbiome. Studies have shown that COVID-19 patients often exhibit reduced microbial diversity and a depletion of beneficial bacteria, such as Faecalibacterium prausnitzii, which is known for its anti-inflammatory properties. Conversely, there is an increase in opportunistic pathogens, such as Enterococcus and Escherichia coli, which may contribute to the inflammatory response observed in these patients. These findings underscore the importance of the gut-lung axis and suggest that gut microbiota could influence respiratory outcomes in COVID-19.

2. Inflammatory Indicators in COVID-19:

Inflammation is a key component of the immune response to SARS-CoV-2 infection. Elevated levels of inflammatory markers such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α) have been consistently reported in COVID-19 patients, correlating with disease severity and poor prognosis. The role of gut inflammation in COVID-19 is of particular interest. The gut-associated lymphoid tissue (GALT) is a critical site for immune cell interactions and cytokine production. Disruption of the gut barrier by SARS-CoV-2 can lead to translocation of microbial products, further fueling systemic inflammation. This gut-originating inflammation may exacerbate the cytokine storm observed in severe COVID-19 cases, highlighting the interconnectedness of the gut and immune system.

3. Pathological Changes in the Gastrointestinal System:

Histopathological studies of COVID-19 patients have revealed various degrees of GI tract involvement, ranging from mild inflammation to severe tissue damage. Autopsies and biopsies have identified viral RNA in the esophagus, stomach, and intestines, supporting the theory of direct viral invasion. These findings are consistent with clinical reports of GI symptoms and complications such as acute pancreatitis, gastrointestinal bleeding, and ischemic enterocolitis. Recent investigations have also explored the impact of COVID-19 on the gut-brain axis, suggesting that GI symptoms could be linked to neurological manifestations of the disease. This bidirectional communication between the gut and the brain might contribute to the wide array of symptoms experienced by COVID-19 patients.

4. Comparative Studies and Methodological Approaches:

Comparative studies examining the gut microbiome and inflammatory responses in COVID-19 patients are essential for understanding the disease's full impact. Methodological approaches typically include high-throughput sequencing of fecal samples to profile microbial communities, coupled with quantification of inflammatory markers through blood tests and tissue biopsies. Previous comparative analyses have provided valuable insights into the differences between COVID-19 patients and healthy controls. However, there remains a need for more comprehensive studies that consider various factors such as age, comorbidities, and treatment regimens, which can influence both gut microbiota composition and immune responses. The interplay between intestinal microflora, inflammatory indicators, and pathological changes in the gastrointestinal system is a complex and evolving field of study in the context of COVID-19. Understanding these interactions is crucial for developing effective therapeutic interventions and improving patient outcomes. This literature review highlights the significant alterations in the gut microbiome and inflammatory responses in COVID-19 patients, emphasizing the need for continued research to unravel the mechanisms driving these changes and their clinical implications.

CONCLUSION

This comparative study underscores the significant impact of COVID-19 on intestinal microflora and inflammatory indicators, highlighting notable differences between patients with and without the virus, particularly those with pathological changes in the gastrointestinal (GI) system. Our findings reveal a clear association between SARS-CoV-2 infection and alterations in the gut microbiome, characterized by a reduction in beneficial bacteria and an increase in opportunistic pathogens. These microbial changes are accompanied by elevated levels of inflammatory markers, suggesting a potential link between gut dysbiosis and systemic inflammation in COVID-19 patients. The evidence of direct viral invasion of the GI tract, combined with the observed microbiome shifts and inflammatory responses, points to a complex interaction between SARS-CoV-2 and the gastrointestinal system. This interaction not only contributes to GI symptoms but also potentially exacerbates overall disease severity through mechanisms such as the gut-lung axis and the gut-brain axis.

Understanding these dynamics is crucial for developing targeted therapies aimed at restoring gut microbial balance and mitigating inflammation. Future research should focus on longitudinal studies to track microbiome changes over the course of the disease and recovery, as well as interventional studies exploring the efficacy of probiotics, prebiotics, and anti-inflammatory treatments in managing COVID-19-related GI complications. In summary, our study provides valuable insights into the gut microbial and inflammatory profiles of COVID-19 patients, offering a foundation for further investigations into the role of the gastrointestinal system in the pathogenesis and progression of the disease. These insights can inform clinical practices and

therapeutic strategies, ultimately improving outcomes for patients with COVID-19 and its gastrointestinal manifestations.

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