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Microbial Landscape in the Stomach of Patients with Urogenic Reactive Arthritis: A Study

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Abstract

This study focuses on the impact of traditional pharmacotherapy on gastric microbiocenosis in patients with reactive arthritis (ReA) of urogenic origin. The research involved 27 patients, analyzing changes in the parietal and luminal microflora before and after treatment. The results revealed notable dysbiotic shifts, with peptostreptococci being the most frequently isolated microorganism, while staphylococci and micrococci declined post-treatment. The findings suggest that pharmacotherapy affects the balance of stomach microflora, reducing pathogenic bacteria and increasing opportunistic microbes. These shifts were also linked to the activity level of ReA. The study highlights the need for gastrointestinal health monitoring during ReA treatment to manage potential dysbiosis effectively. Future studies should explore the long-term impacts of treatment and optimal methods for preserving healthy gastric microflora.

Keywords

Reactive Arthritis, Microbiocenosis, Mucous Layer of the Stomach, Gastric Juice

Introduction

Reactive arthritis (ReA), first identified over 50 years ago, was initially associated with arthritis following yersiniosis, without infectious agents in the joints. Later, the condition was linked to infections of the gastrointestinal, genitourinary, and nasopharyngeal systems. ReA is now understood as a non-purulent joint inflammation occurring within 6-8 weeks after an infection, such as those caused by sexually transmitted diseases, particularly affecting young men aged 17-40 (ICD-10 code M02). The rising incidence of ReA can be attributed to genetic predispositions, asymptomatic infections, and delayed treatment. Unregulated antibiotic use for ReA can disrupt the gastric microbiota, leading to further complications. Recent research into the microbial composition of the gastric mucosa has redefined the microbial landscape, improving understanding of conditions like gastritis and peptic ulcers, though there remains disagreement regarding the role of Helicobacter pylori in gastric infections [1,2]. Furthermore, the diversity and abundance of stomach microflora in various pathological states remain debated among experts [3,4]. Thus, studying the species composition of gastric microflora in patients with ReA of urogenic origin is highly relevant [5]. This research may provide valuable insights into managing such infections and could offer significant contributions to medical science by improving our understanding of microbial involvement in disease.

Materials and Methodology

The study involved 27 patients aged 27 to 54 years (average age 36) with reactive arthritis of urogenic origin and microbiocenosis disorders in the gastroduodenal zone, excluding those with other concomitant diseases. Gastric biopsy samples were collected and examined using microbiological methods. The biological material was inoculated onto various agars, including Helicobacter agar, blood agar, Endo agar, yolk-salt agar, and Sabouraud agar. Anaerobic microflora were isolated using an enriched nutrient medium. A portion of the biopsy material in saline solution was also used for the urease test. The analysis of gastric microflora included both quantitative assessment from solid inoculation media and qualitative analysis from enriched media.

Species typing of isolates was performed using standard nutrient media and diagnostic test systems. To verify Helicobacter pylori colonisation in the gastric mucosa, additional tests were conducted, such as biopsy cytology and enzyme-linked immunosorbent assay (ELISA) of blood to detect total antibodies (IgM, IgA, IgG) against the CagA antigen. Inclusions were restricted to patients with reactive arthritis and gastroduodenal microbiocenosis disorders, while those with additional illnesses were excluded to maintain a focused study cohort.

Results

The study aimed to evaluate the impact of traditional pharmacotherapy on the microbiocenosis of the stomach in patients with reactive arthritis (ReA) of urogenic etiology. Significant dysbiotic changes were observed in the microbial landscape of both the gastric biopsy and gastric juice before and after treatment. The results indicate a clear shift in the spectrum and frequency of microorganisms, both in the parietal and luminal microflora.

Microbial Changes in the Parietal Layer

Before treatment, the parietal layer showed a variety of microorganisms, with peptostreptococci being the most frequently isolated (62.5%), followed by staphylococci and enterococci (37.5%) and micrococci (12.5%). These microorganisms were present in quantities ranging from 2.61 to 4.43 lg CFU/g. The data also indicated an increased presence of opportunistic microflora, particularly anaerobic gram-positive cocci.

After treatment, a notable decrease in staphylococci (2.61 lg CFU/g) and micrococci (3.3 lg CFU/g) was observed, whereas peptostreptococcal cultures increased (3.38 lg CFU/g), indicating a shift towards a narrower microbial spectrum. This change suggests a general decline in the presence of pathogenic microorganisms.

Intraluminal Microbiocenosis: Gastric Juice

In the gastric juice of patients with ReA, the microbial landscape followed a similar pattern. Before treatment, peptostreptococci were isolated from 75% of the patients, while staphylococci were found in 25%, and streptococci and enterococci in 12.5%. The microbial quantities ranged from 102 to 3.8x10^3 lg CFU/ml.

After treatment, there was a reduction in the frequency of occurrence of characteristic gastric microflora and an increase in opportunistic and fecal microflora, pointing to dysbacteriosis. For example, staphylococcus levels dropped from 5.5x10^3 CFU/ml to undetectable levels, while peptostreptococcal levels increased from 3x10^3 CFU/ml to 10^4 CFU/ml, indicating a shift towards opportunistic microorganisms.

Table 1: Quantitative Characteristics of Gastric Juice Microflora (CFU/ml) Before and After Treatment.

Microorganism	Before Treatment (Act I)	After Treatment (Act I)	Before Treatment (Act II)	After Treatment (Act II)
Staphylococcus	1x10^3	1x10^2	5.5x10^3	-
Streptococcus	1x10^8	-	3.1x10^5	1x10^3
Bacilli	1x10^4	-	4x10^3	-
Enterococci	1x10^3	3x10^3	-	-
Peptostreptococci	2.1x10^3	3.1x10^3	3x10^3	1x10^4

Changes in Mucosal Microflora

The mucosal layer of the stomach also displayed significant microbial shifts based on the activity of the disease. Before treatment, peptostreptococci were frequently isolated in cases of lower disease activity (Act I), while in Act II, there was an increase in enterococci and peptostreptococci. After treatment, the quantity of staphylococcal and micrococcal cultures decreased, while peptostreptococcal cultures increased significantly.

In Act I, staphylococcus levels dropped from 3 lg CFU/ml to 2.61 lg CFU/ml after treatment, while peptostreptococci increased from 3 lg CFU/ml to 4.14 lg CFU/ml in Act II. This indicates that as disease activity increases, the therapy is effective in reducing the number of pathogenic microorganisms in the mucosal layer.

Table 2: Quantitative Characteristics of Mucosal Microflora (lg CFU/ml) Before and After Treatment

Microorganism	Before Treatment (Act I)	After Treatment (Act I)	Before Treatment (Act II)	After Treatment (Act II)
Staphylococcus	3	2.61	5.3	-
Streptococcus	3.77	-	6.45	-
Micrococcus	5	3.3	-	-
Enterococci	5	4.45	5	4.4
Peptostreptococci	3	3.2	3.2	4.14

Discussions

The results demonstrate that traditional pharmacotherapy for ReA of urogenic etiology significantly alters the gastric microbiocenosis, with reductions in both pathogenic and opportunistic microorganisms. The observed shifts in microbial populations, particularly the increase in peptostreptococci and reduction of staphylococci and micrococci, suggest that treatment helps restore balance in the stomach's parietal and luminal microflora. Additionally, the disease activity plays a crucial role in these microbial changes, with higher activity resulting in more pronounced dysbacteriosis. Overall, the findings highlight the importance of monitoring gastrointestinal health during ReA treatment to address potential dysbiosis.

Conclusions

This study evaluated the impact of traditional pharmacotherapy on gastric microbiocenosis in patients with reactive arthritis (ReA) of urogenic etiology. The results revealed significant dysbiotic changes before and

after treatment. Prior to treatment, peptostreptococci were isolated in 62.5% of patients, while staphylococci and enterococci were found in 37.5%. After treatment, peptostreptococci increased, while staphylococci and micrococci decreased. In gastric juice, peptostreptococci were found in 75% of patients pre-treatment, increasing further after treatment. These changes indicate that pharmacotherapy alters the balance of stomach microflora, with reductions in pathogenic microorganisms. The study implies that monitoring gastrointestinal health during ReA treatment is essential to prevent dysbiosis. Future research should focus on the long-term effects of treatment and explore strategies to maintain a healthy gastric microbiota.

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Note: All the tables in this chapter were made by the author.