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Microbiological and Clinical Characteristics of a Potential Emerging Pathogen

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Introduction

Gastrointestinal infections are a global public health threat, with high rates of morbidity and mortality. According to the Global Burden of Disease Study 2016, acute gastroenteritis caused approximately 89.5 million disability-adjusted life years lost and 1.45 million deaths each year. Every year, approximately 179 million people in the United States suffer from diarrheal illnesses. Other health conditions, such as reiter's syndrome, guillain barré syndrome, and irritable bowel syndrome, have been linked to GIs. Vomiting, diarrhea, abdominal pain, and fever are all possible symptoms. Because of the nonspecific symptoms seen in GIs, the aetiology is frequently unknown. Primary treatment may include the use of antimicrobial agents based on clinical manifestations [1].

Description

A wide variety of pathogens have been linked to GI aetiology. Stool culture is the gold standard diagnostic method for bacterial gastroenteritis. However, this technique is limited because some bacteria have non-conventional growth requirements; the time to result is usually long; and improper sample handling is possible and may affect the result, such as when collecting the stool sample after the antibiotic treatment has begun. Other traditional diagnostic methods include parasitic pathogen microscopic examination and enzyme immunoassays, which are used to identify viral, bacterial, and parasitic infections. In recent years, there has been a technological leap in infectious disease diagnostics, from traditional to syndromic diagnosis, using molecular assays that detect multiple pathogens simultaneously, including viruses, fungi, parasites, and bacteria within a few hours.

In clinical microbiology laboratories in Israel, routine stool culture diagnosis includes testing for three bacteria: Campylobacter, Salmonella, and Shigella. Campylobacter was detected by stool culture in 19.7% of the positive samples, compared to 34.4% by GIP; Salmonella was detected by both culture and GIP in 14.7% of the positive samples. Stool culture detected no Shigella, and GIP detected only one case. These findings support previous findings that the GIP has a higher positivity rate than culture. This can be attributed to the main limitations of culture, such as the difficulties in culturing bacteria after antibiotic administration or when the causative bacterium is fastidious and requires special growth conditions.

Campylobacter was the most common pathogen among children in their first year of life (52.4%) and the 2-5 years group (34.8%), according to an analysis of pathogens by age group. A previous study found that Campylobacter caused the highest associated burden of diarrhoea in 0-1-year-old children from Loreto, Peru and Venda, as well as South Africa. Campylobacter infections are more common in certain age groups, including children under the age of four and people over the age of 75. High exposure to outsourced food services, where food handling, storage, and cooking may be improper at times, is one of the risk factors for gastroenteritis in young children [2].

The microorganisms used in industrial microbiology can be classified into three groups: bacteria, fungi, and algae. Bacteria are the most commonly used microorganisms in industrial microbiology, and they are used to produce a wide range of products, including antibiotics, enzymes, and organic acids. Fungi are used to produce a variety of products, including antibiotics, enzymes, and organic acids. Algae are used to produce biofuels, food additives, and pigments. The pharmaceutical industry is one of the major users of industrial microbiology. Microorganisms are used to produce antibiotics, vaccines, and other therapeutic products. The use of microorganisms in the pharmaceutical industry has revolutionized the production of drugs, and many life-saving drugs are produced using microorganisms. For example, penicillin, one of the most important antibiotics, is produced by the fungus Penicillium chrysogenum.

The food industry is another major user of industrial microbiology. Microorganisms are used to produce a variety of food products, including bread, cheese, yogurt, and beer. In the food industry, microorganisms are used to convert raw materials into finished products. For example, yeast is used to ferment sugars into alcohol during the production of beer. The chemical industry is another major user of industrial microbiology. Microorganisms are used to produce a variety of chemicals, including organic acids, solvents, and enzymes. The use of microorganisms in the chemical industry has several advantages, including cost-effectiveness and environmental sustainability. For example, the production of lactic acid using bacteria is a cost-effective and environmentally sustainable process [3].

The biofuel industry is another major user of industrial microbiology. Microorganisms are used to produce biofuels, including ethanol and biodiesel. The use of microorganisms in the biofuel industry has several advantages over traditional fossil fuels, including environmental sustainability and renewable energy. For example, ethanol can be produced by fermenting sugars using yeast [4]. Fermentation is the process by which microorganisms convert a substrate into a product. Fermentation is used in the production of a wide range of products, including antibiotics, enzymes, and organic acids. During fermentation, microorganisms utilize the substrate as a source of energy and produce the desired product. Fermentation can be carried out using a variety of microorganisms, including bacteria, fungi, and yeast [4,5]. Downstream processing is the process by which the product is separated and purified from the fermentation broth. Downstream processing is an essential step in the production of many commercial products, including antibiotics, enzymes, and organic acids. The downstream processing includes several steps, including filtration, centrifugation, and chromate.

Conclusion

When compared to traditional methods, the GIP provides syndromic testing in much less time. The GIP reduces antibiotic misuse and length of stay, both of which indirectly reduce healthcare costs and improve patient clinical management. Furthermore, a positive GIP result facilitates and expedites physician decision-making, such as determining whether to discontinue or change antibiotic treatment, selecting the targeted antibiotic, and introducing/removing a patient from isolation, all of which have important implications for infection control. Overall, the addition of the clinical laboratory represents a significant advancement in the diagnosis of IGE.

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Conflict of Interest

None.

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