Comparison of Commercial DNA Extraction Kits for Recovery of Bacterial, Protozoal, and Viral Organisms Spiked In Human Fecal Samples

Abstract:

Background: There is an increasing interest in monitoring the gastrointestinal microbiome as it is recognized as being linked to several health conditions. Several PCR-based approaches are being used to monitor the gut microbiome. However, there are limitations to accessing the exact microbial profile present in stool. A traditional method of DNA extraction often involves liquid-liquid extraction of DNA from stool or other biological samples. These methods have inherent drawbacks in terms of performance, cost, and ease of use.

Materials & Methods: Three kits were evaluated for the efficiency and throughput of DNA extraction from human stool samples: PowerLyzer™ PowerSoil®, PowerMag™ Soil, and KingFisher Plant DNA Isolation Kit. Each kit was evaluated for the detection of three enteric pathogens (Cryptosporidium parvum, Adenovirus 41, and Vibrio parahaemolyticus) and one enteropathogenic bacteria (Shigella sonnei) at varying concentrations. DNA extraction was performed according to the manufacturer's protocol.

Results:

DNA extraction was performed using three different kits: PowerLyzer™ PowerSoil®, PowerMag™ Soil, and KingFisher Plant DNA Isolation Kit. The results showed that PowerLyzer™ PowerSoil® had the highest sensitivity for all three enteric pathogens tested, followed by PowerMag™ Soil and KingFisher Plant DNA Isolation Kit. The KingFisher Plant DNA Isolation Kit showed the lowest sensitivity for all three enteric pathogens tested.

Conclusion:

The study showed that the PowerLyzer™ PowerSoil® kit was the most effective for DNA extraction from human stool samples, followed by PowerMag™ Soil and KingFisher Plant DNA Isolation Kit. These findings suggest that the selection of an appropriate DNA extraction kit is crucial for the detection of enteric pathogens in stool samples.