Ribotype 027 is Associated with Increased Lactoferrin and Toxin in Patients with Clinically Defined C. difficile Disease.

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ABSTRACT

BACKGROUND: C. difficile infection (CDI) has continued to increase with hypervirulent strains causing outbreaks worldwide. The predominant outbreak strain in North America, BI/NAP1/027 (027) has been associated with an increased incidence and greater severity. 027 is fluoroquinolone resistant and produces more spores than non-hypervirulent strains contributing to its ability to spread. Currently, there is conflicting data for whether 027 actually produces more toxin than non-hypervirulent strains and if increased toxin is potentially the cause of more severe disease.

AIM: In this study, we identified ribotypes and evaluated lactoferrin and toxin levels in clinically defined patients with CDI.

METHODS: Patients with CDI presenting with a spectrum of severity were recruited. Disease activity was defined by physician’s assessment based on symptoms, WBC count (<10K) and co-morbidities. Fecal lactoferrin (µg/mL) and error and C. difficile toxins A and B were detected in stool using enzyme-linked immunosorbent assay (ELISA).

Summary: Our results demonstrate that 027 is associated with more fecal toxin, increased lactoferrin levels, and higher WBC counts, all indicators of more severe CDI.

RESULTS

Prevalence of Ribotypes isolated from patients in the Summa Health System

INTRODUCTION

Clostridium difficile is the leading cause of hospital-acquired antibiotic-associated diarrhea (AAD) and colitis (Wilkins and Lyerly, 2003). Incidence of this disease has increased as more community infections are being identified. An epidemic strain (BI/NAP1/027) shows resistance to fluoroquinolones and higher levels of toxin produced as well as increased spores. Clinical testing presents significant challenges because of the increased number of cases, the additional patient populations being affected, and the types of diagnostic methods now available to the clinician. Most cases are diagnosed based on clinical evaluations, history of antibiotic use, and the presence of toxin in the stool (toxin A/B). Biomarkers such as lactoferrin may provide additional diagnostic insight. Lactoferrin is a stable protein produced by neutrophils during an immune response, and is an indicator of inflammation (Gisbert et al., 2009). In healthy individuals, lactoferrin levels in stool are expressed by mean EIA absorbance which was higher (p=0.02) for pts infected with 027 (2.501) than non27 (1.491).

CONCLUSION: Our results demonstrate that 027 is associated with increased lactoferrin, toxin and higher WBC counts, all indicators of severe CDI.

RESULTS

Average Lactoferrin Levels Stratified According to Disease Severity

Percentage of C. difficile Isolates by Severity and Ribotype

Summary: There was higher detection of GDH and toxin in patients with ribotype 027 vs. patients with non027.

CONCLUSIONS

Our results demonstrate that ribotype 027 is associated with increased lactoferrin, toxin, and higher WBC counts, all indicators of severe CDI.