Infectious Diseases Diagnosis & Treatment
Wombwell E. Infect Dis Diag Treat 6: 193.
www.doi.org/ 10.29011/2577- 1515.100193
www.gavinpublishers.com

OPEN ACCESS

GAVIN PUBLISHERS

Research Article

Saccharomyces boulardii Administration and Fecal Microbiota Transplant Response in Recipients Treated for Recurrent *Clostridioides difficile* Infection

Eric Wombwell[1,2*]

[1]Division of Pharmacy Practice and Administration, University of Missouri-Kansas City School of Pharmacy, Kansas City, Missouri, USA

[2]Department of Pharmacy, Centerpoint Medical Center, Independence, Missouri, USA

[*]**Corresponding author:** Eric Wombwell, Division of Pharmacy Practice and Administration, University of Missouri-Kansas City School of Pharmacy, Kansas City, Missouri 64108, USA

Citation: Wombwell E (2022) *Saccharomyces boulardii* Administration and Fecal Microbiota Transplant Response in Recipients Treated for Recurrent *Clostridioides difficile* Infection. Infect Dis Diag Treat 6: 193. DOI: 10.29011/2577-1515.100193

Received Date: 18 May 2022; **Accepted Date:** 23 May 2022; **Published Date:** 27 May 2022

Abstract

Objective: Assess the influence of *S. boulardii* administration on fecal microbiota transplant (FMT) success in patients with *Clostridioides difficile* infection (CDI)-related hospitalization and increased risk of poor response to FMT. **Methods:** Retrospective analysis of FMT recipients admitted between January 1, 2016 and December 31, 2020. **Results:** Observed FMT success in patients administered *S. boulardii* was 91.7% (22/24) versus 82.4% (14/17) in patients not administered *S. boulardii* ($p > 0.05$). In patients with antibiotic discontinuation, successful FMT was observed in all patients administered *S. boulardii* (12/12) versus 80% (12/15) in those without *S. boulardii* ($p > 0.05$). **Conclusion:** Data suggest potential benefit to *S. boulardii* administration both prior to and following FMT.

Keywords: Clostridium infections; Saccharomyces; Probiotics; Fecal microbiota transplantation; Mycobiota

Background

Fecal microbiota transplant (FMT) is recommended for patients with multiple recurrences of *Clostridioides difficile* infection (CDI) having failed antibiotic treatment [1]. FMT is associated with an 81-93% success rate dependent on route of instillation [2]. Evidence assessing factors contributing to successful transplantation remain sparse, but include avoidance of antibiotics post-FMT, absence of inflammatory bowel disease, and good bowel preparation. CDI-related hospitalization before FMT, inpatient FMT, and severe CDI are associated with increased risk of FMT failure [3].

Little is known about the effect of the mycobiota on FMT outcomes in patients with CDI. However, a recent analysis found that the fungal genera *Saccharomyces, Aspergillus*, and *Penicillum* were relatively more abundant in FMT responders post-FMT than in nonresponders [4]. At our institution, a *Saccharomyces boulardii* based probiotic is used for primary prophylaxis of hospital onset CDI. Here we describe the effect of incident *S. boulardii* administration in FMT recipients treated for recurrent *Clostridioides difficile* infection in a population at increased risk for poor response to FMT.

Methods

This is a five-year, retrospective cohort study assessing FMT success in patients with incident *S. boulardii* administration

directly prior to and following FMT. Patients are included if they were aged 18 years or older and underwent FMT (colonoscopy with fecal transplant) while admitted to the institution between January 1, 2016 and December 31, 2020. The independent variable is a two-level categorical variable classifying patients as administered of *Saccharomyces boulardii lyo* CNCM I-745 (Florastor Daily Probiotic Supplement®, Biocodex, Inc., Redwood City, CA, USA) for a minimum of two days prior to FMT and at least one dose following FMT verified by barcode administration records. The dependent variable of interest is a two-level categorical variable classifying patients as having failed FMT defined as evidence of diarrhea symptoms noted in patient medical record and a positive *Clostridioides difficile* stool test within the eight weeks following FMT.

All patients assessed were hospitalized for CDI management and underwent FMT while admitted. The dose of *S. boulardii* used at the institution is 500mg twice daily. *S. boulardii* is not approved for prevention of CDI or for use with FMT. All patients were administered frozen microbiota specimen (OpenBiome item: FMP250, Somerville, Massachusetts, US) via colonoscopy. Baseline characteristics included patient age, gender, procedure date, time to failure, presence of North American pulsed-field gel electrophoresis type 1 (NAP1) strain, and continuation of antibiotics following FMT.

Fisher's exact statistics was used to test for unadjusted associations between *S. boulardii* administration and the incidence of FMT success.

Results

The study included 41 patients who underwent FMT. FMT failed in five total patients (12.2%). Incident *S. boulardii* administration for at least two days prior to FMT and at least one dose after FMT occurred in 24 patients. More patients administered *S. boulardii* had antibiotics continued following FMT ($p = 0.01$). All other baseline characteristics were similar between groups. (Table 1) The FMT success rate observed for patients administered *S. boulardii* was 91.7% (22/24) versus 82.4% (14/17) in those not administered *S. boulardii* ($p > 0.05$). (Table 2) No patients with discontinuation of antibiotics and administration of *S. boulardii* prior to FMT experienced FMT failure.

	All patients (n = 41)	***Saccharomyces boulardii* Administered (n = 24)**	**No *Saccharomyces boulardii* Administered (n = 17)**	**P value**
Age, mean (SD), y	71.6 (16.8)	75.8 (14.8)	65.7 (18.1)	.056
Female, n (%)	27 (65.8)	16 (66.7)	11 (64.7)	.896
NAP-1 strain primary case, n (%)	15 (36.6)	10 (41.7)	5 (29.4)	.422
Antibiotics administered post FMT, n (%)	14 (34.1)	12 (50)	2 (11.8)	.011
FMT: Fecal Microbiota Transplant**;** NAP-1: North American pulsed-field gel electrophoresis type 1				

Table 1: Baseline Characteristics of Subjects

	All patients (n = 41)	***Saccharomyces boulardii* Administered (n = 24)**	**No *Saccharomyces boulardii* Administered (n = 17)**	**P value**
FMT success- all patients, n (%)	36 (87.8)	22 (91.7)	14 (82.4)	.369
FMT success- patients not administered antibiotics post-FMT, n (%)	25 (89.3)	12/12 (100%)	12/15 (80%)	.231
FMT: Fecal Microbiota Transplant				

Table 2: Outcomes of Fecal Microbiota Transplant

Discussion

This study assesses the influence of *Saccharomyces boulardii* lyo CNCM I-745 administration on FMT response in a population at increased risk of FMT failure due to CDI-related hospitalization and inpatient FMT receipt. It was observed that patients administered *S. boulardii* had a higher numerical FMT response rate versus patients not administered *S. boulardii*, this did not achieve statistical significance. The analysis and case rate for FMT failure is small and limits our ability to detect a statistical difference. Additionally, this analysis failed to capture patients that may have developed symptoms of recurrent CDI not requiring re-hospitalization or who sought medical treatment at an alternative facility.

The full extent of *S. boulardii* benefit present in this analysis may be masked by the high rate of antibiotic continuation present in the *S. boulardii* recipient group. Half of the patients administered *S. boulardii* had antibiotics continued following FMT. In comparison, only two patients (11%) not administered *S. boulardii* continued to receive antibiotics following FMT. *S. boulardii* is used at our facility to prevent CDI in patients on antibiotics, which is why a higher prevalence of antibiotic continuation is observed in the *S. boulardii* recipients.

Continuation of antibiotics immediately leading up to FMT and following FMT is a significant risk factor for FMT failure. [3-4] All FMT failures in the *S. boulardii* cohort occurred in patients with antibiotic continuation. In subgroup analysis of patients with antibiotic discontinuation, those with *S. boulardii* administration prior to and following FMT experienced a FMT success rate of 100% (12/12) compared to 80% (12/15) for those without *S. boulardii* administration. This suggests that there may be a beneficial effect on FMT success and CDI treatment from the administration of *S. boulardii* prior to and following FMT.

Conclusion

This is a small retrospective observation study that is strictly hypothesis generating. No statistical difference in FMT outcomes was detected in patients with incident *S. boulardii* administration. *S. boulardii* administration did not contribute to worse outcomes and may be associated with improved FMT outcomes. Further study is therefore warranted to further assess the role of *S. boulardii* in FMT administration for CDI treatment.

Acknowledgments

Financial Support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. This research was supported in part by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities. Potential conflicts of interest. The author reports no conflicts of interest relevant to this article.

Specific Author Contributions

EW- Substantial contributions to the conception and design of the work; analysis and interpretation of data; drafting, revising, and final approval of the version to be published.

References

1. McDonald LC, Gerding DN, Johnson S, Bakken JS, Carroll KC, et al. (2018) Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA). Clin Infect Dis 66: e1-e48.
2. Cammarota G, Ianiro G, Gasbarrini A (2014) Fecal microbiota transplantation for the treatment of *Clostridium difficile* infection: a systematic review. J Clin Gastroenterol 48: 693-702.
3. Tariq R, Hayat M, Pardi D, Khanna S (2021) Predictors of failure after fecal microbiota transplantation for recurrent *Clostridioides difficile* infection: a systematic review and meta-analysis. Eur J Clin Microbiol Infect Dis 40: 1383-1392.
4. Zuo T, Wong SH, Cheung CP, Lam K, Lui R, et al. (2018) Gut fungal dysbiosis correlates with reduced efficacy of fecal microbiota transplantation in Clostridium difficile infection. Nat Commun 9: 3663.