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ORIGINAL RESEARCH

PERIOPERATIVE PROBIOTICS OR SYNBIOTICS IN ADULTS UNDERGOING ELECTIVE ABDOMINAL SURGERY

Dr. Mohit Sharma[1], Dr. Uzma Padwal[2], Dr. Varsha Choudhary[3], Dr. Shyam Kumar Gupta[4], Dr. Ratnakar Sharma[5]

[1]Resident, Department of General Surgery, GMC, Jammu, India.
[2]Resident, Department of General Surgery, GMC, Jammu, India.
[3]Resident, Department of General Surgery, GMC, Jammu, India.
[4]Assistant Professor, Department of General Surgery, GMC, Jammu, India.
[5]Professor, Department of General Surgery, GMC, Jammu, India.

Corresponding Author
Dr. Varsha Choudhary

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Abstract
Objective: *To determine the effects of preoperative probiotic or synbiotic treatment on patients having abdominal surgery's postoperative results.*
Methods: *Between 2019 and December 2022, patients over 70 years old who are having a laparoscopic colon resection at our unit will participate in this prospective, double-blind, randomised trial. Following the signing of an informed permission, all patients were enrolled. The patients were divided into Group A (antibiotic + probiotic), Group B (antibiotic + synbiotic), Group C (antibiotic + placebo), or Group A (antibiotic + synbiotic).*
Results: *Ten patients (5 men) made up Group A; eight patients (4 men) made up Group B; and ten patients (6 men) made up Group C. Each group had one patient who developed a postoperative problem that was treated conservatively.*
Conclusion: *Probiotics and synbiotics both lower the risk of postoperative infection, but synbiotics have a stronger effect.*
Keywords: *Elective abdominal surgery, outcomes, probiotics, synbiotics*

Introduction

Sepsis continues to be a prominent cause of morbidity and mortality, especially in postoperative patients, and is a significant issue for healthcare organisations all over the world. [1,2] Despite improvements in antibiotic therapy and the introduction of infection control procedures, sepsis is becoming more common. [2–5] The demand for novel or alternative techniques to lower the risk of infection in surgical patients has grown as a result of the shortcomings of infection control strategies and the growing global concern about antibiotic resistance.

The World Health Organization [6] defines probiotics as living bacteria that, when administered in adequate amounts, have positive effects on the host. They remain alive during passage through the digestive system, with the majority of their activity occurring in the colon. [7] Prebiotics are food components that bypass upper gastrointestinal tract digestion in order to promote the expansion or activity of particular bacterial genera in the colon. [8] Synbiotics are a term used to describe preparations that contain both prebiotics and probiotics. [9] These dietary supplements have come to light as prospective therapies that may aid in lowering the frequency of postoperative infection.

Probiotics have been demonstrated to be effective in the treatment of gastrointestinal infections; they work in conjunction with oral rehydration therapy to effectively treat acute infectious diarrhoea in children, traveler's diarrhoea, and antibiotic-associated diarrhoea in both children and

adults, [10–17]. [18–21] Probiotics work through a combination of direct antimicrobial actions and competitive exclusion of potentially harmful bacteria. [22]
Probiotics modify the pH of the intestinal mucosa, produce bacteriocins that block the development of virulence factors and the adhesion of pathogenic epithelial cells, and stop bacterial translocation through tight junctions. [22,23] Probiotic bacteria have also been found to encourage the generation of anti-inflammatory cytokines. [22,24] The co-administration of prebiotics can increase the growth of probiotic bacteria, and these substances specifically encourage the growth of some bacterial genera while suppressing others. [25]

Prebiotics and probiotics have been studied for their potential to reduce postoperative complications in a variety of randomised controlled trials (RCTs), but the results have been inconsistent, most likely as a result of differences in methodological quality and objectives. Probiotics seldom cause serious side effects in healthy people, but it's possible that they could in patients with compromised immune systems. Administration of probiotics was linked to an increase in the frequency of intestinal ischemia in patients with severe pancreatitis. [26,27] Before probiotic usage in the perioperative context can be advised, a thorough examination of the potential for negative effects is required. In this RCT, adult patients undergoing elective abdominal surgery were examined to determine the impact of preoperative probiotics or synbiotics on postoperative infections.

Materials and methods

Between 2019 and December 2022, patients over 70 years old who are having a laparoscopic colon resection at our unit will participate in this prospective, double-blind, randomised trial. Following the signing of an informed permission, all patients were enrolled. The patients were divided into Group A (antibiotic + probiotic), Group B (antibiotic + synbiotic), Group C (antibiotic + placebo), or Group A (antibiotic + synbiotic). Patients in each group were further separated into subgroups 1 and 2, depending on whether the ileocecal valve was intact during surgery. Following discharge, patients were seen by a resident in an outpatient environment seven days a week for four weeks. Patients and residents were not informed whether a probiotic or a placebo was being used.

Patients with Dukes D colorectal cancer, inflammatory bowel illnesses, the requirement for a temporary or permanent ostomy, and any allergy to the study's antibiotics, probiotics, synbiotics, or placebo were disqualified from participation.

All patients who met the inclusion criteria and underwent surgery in a timely manner during the trial period were recruited. The data are shown as mean ± SD. When comparing categorical variables, Fisher's exact test was employed; when comparing continuous parameters, Student's t test was applied.

Results

Ten patients (5 men) made up Group A; eight patients (4 men) made up Group B; and ten patients (6 men) made up Group C. Table 1 lists the patient characteristics and surgery parameters. Each group had one patient who developed a postoperative problem that was treated conservatively.

Table 1: Characteristics of patients and surgical details

	Group A (antibiotic + probiotic)	Group B (antibiotic + synbiotic),	Group C (antibiotic + placebo)	P value
No of patients	10	8	10	0.051
Male /Female	5/5	4/4	6/4	0.066
Age	71.5 (±2.1)	72.9 (±1.6)	71.9 (±1.8)	0.04
BMI, kg/m2	21.5 (±3.9)	20.4 (±2.7)	21.4 (±2.9)	0.078
Comorbidities, n (%)	8 (80)	7 (87.5)	8 (80)	0.081
Operative time. min (± SD)	160.3 (±33.2)	157.8 (±40.9)	155.8 (±41.1)	0.07
Length of stay, day (± SD)	12.0 (± 8.3)	12.5 (± 5.7)	13.5 (± 4.8)	0.05

Discussion

Although necessary, perioperative antibiotic medication is to blame for relevant gut microbiota abnormalities [28,29]. Because of the movement of microorganisms, this could increase the risk of infectious problems. Additionally, the perception of symptoms is heightened because of an imbalance in the gut microflora's components [28]. Probiotic preparations have not been shown to significantly lower the rate of postoperative septic complications in patients having elective abdominal surgery [30]. Studies examining the impact of probiotics administration in the early post-operative period on the perception of symptoms in elderly patients having large bowel resection are lacking in the literature, nevertheless. Although not statistically significant, we noticed in our series that patients taking probiotics had fewer evacuations, and patients undergoing resection without retaining the ileo-caecal valve received probiotic treatment at a slightly greater rate.

The analysis of pooled data from RCTs shows that the risk of infectious complications following abdominal surgery is greatly reduced by the perioperative administration of probiotics and synbiotics, with a magnitude of this risk reduction approaching 50%. Synbiotic formulations reduced the risk of infection more than probiotics alone did, demonstrating that prebiotic substrates can boost the positive effects of probiotics. The LOS was also decreased in the synbiotic group but not in the probiotic group. Mortality or non-infectious consequences were unaffected.

Different treatment lengths were used by the studies included in this analysis; the majority of the larger studies, which provided the majority of the weighting, had treatment lengths of more than 10 days. Whether the patient had treatment for 10 days or less or for 10 days or more, the chance of infection was reduced. A separate weighted metaregression examining the link between treatment duration and infection RR did not find any significance. This could be explained by one of two things: either the analysis lacked trials with a wide enough range of treatment durations, decreasing power, or there is a minimum treatment length that is necessary to notice an effect above which no extra benefit is seen. Therefore, it is challenging to determine the minimal or ideal length of treatment from this.

Conclusion

In the context of elective abdominal surgery, probiotics and synbiotics are safe and rarely cause side effects. Probiotics and synbiotics both lower the risk of postoperative infection, but synbiotics have a stronger effect. Before it is possible to determine the efficacy of specific preparations and the ideal length of treatment, additional large multicenter trials with standardisation of probiotic and synbiotic preparations, participants, kind of operation, and postoperative care are required.

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