
RESEARCH ARTICLE

The Effect of Probiotics on Short Chain Fatty Acid Levels in Colorectal Cancer Patients Who Undergoing Chemotherapy at Dr. Mohammad Hoesin General Palembang Hospital

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ABSTRACT

Chemotherapy is the modality of colon cancer therapy that can reduce SCFA levels in the intestine. Probiotics are currently known to have a role in the pathogenesis of colon cancer and adjunct therapy for colon cancer patients. This study aims to examine the effect of probiotics on SCFA levels in faeces in colorectal cancer patients undergoing chemotherapy at RSMH Palembang; A randomized controlled trial in Hematology Oncology Polyclinic between September 2021 and September 2022. The total number of subjects was 44, and then SCFA stool levels were examined at the study's beginning and end; Then, the analysis was carried out. About 37 subjects (19 probiotic group and 18 placebo groups) were analyzed, mean age was $45,62 \pm 8,98$ years. After intervention, the mean change of SCFA were 0.5786 ± 3.887 mg/ml in probiotic group VS $-2, 22 \pm 2.045$ mg/mL (p-value 0.001). Probiotics have a significant effect on increasing SCFA levels in colorectal patients who were undergoing chemotherapy at Dr. Mohammad Hoesin General Palembang Hospital.

KEYWORDS

Probiotics, scfa, colorectal, chemotherapy

ARTICLE INFORMATION

ACCEPTED: 14 October 2022

PUBLISHED: 27 October 2022

DOI: 10.32996/jmhs.2022.3.4.10

1. Introduction

Colorectal cancer is a malignancy of the colon or rectum, which ranks 3rd with an incidence of 1,931,590 and a mortality rate of 935,173 (GLOBOCAN 2020). The management of colorectal cancer is multidisciplinary, according to the histology and stage, one of which is chemotherapy. Various chemotherapeutic agents that can be used include gastrointestinal toxicity, hematology, alopecia, and other organ toxicity, thereby reducing a person's quality of life. SCFA is produced in the human colon from dietary fibre and starch by commensal microbiota. Pathogenesis and chemotherapy have been associated with the alteration of intestinal microbiota, with decreased short-chain fatty acid levels. SCFA has an essential role in colorectal cancer therapy as a source of energy for colonocytes, reduces inflammatory reactions, and has an apoptotic effect, thereby increasing the effectiveness of chemotherapy. Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit on the host (IASPP). Lactobacillus is a lactic acid bacteria that is commonly used as a probiotic. This study aimed to investigate the effect of probiotic administration on SCFA levels of colorectal cancer patients who underwent chemotherapy. (Nagpal et al. 2018).

2. Methods

This study is a randomized control double-blind trial. A total of 44 subjects met the inclusion criteria and were divided into two groups, namely the probiotic group and the placebo group, each with 22 people. Subjects received the probiotic Lacidophil® and a placebo containing lactulose two times a day for eight weeks. Before and after the intervention, gas chromatography techniques examined SCFA stool levels in Prodia Clinical Laboratory. After data collection, SPSS25 for windows was used for data analysis. The Hospital Ethics Committee approved the ethical clearance of Dr. Mohammad Hoesin General Hospital (no.137/kepkrsmh/2021).

3. Results

During the study, there were 7 subjects who could not complete the research, so 37 subjects were obtained who could be analyzed for data.

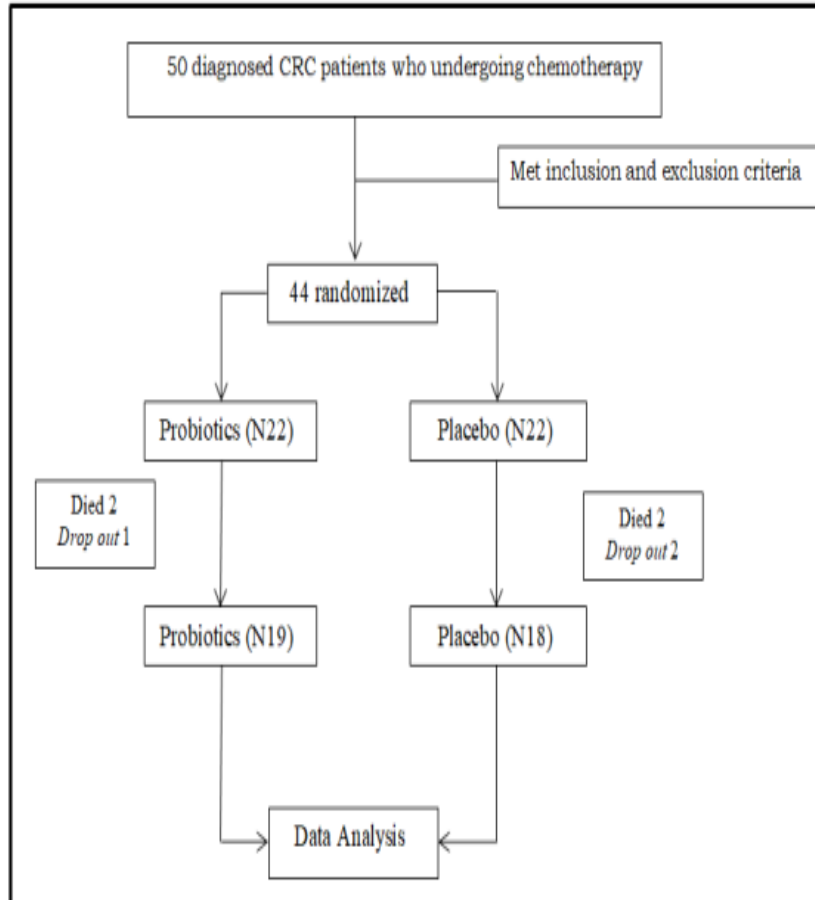


Figure 1. Research result chart

The results of the research regarding the sociodemographic data of the subjects can be seen in Table 1.

Table1. Baseline characteristics of research subjects

Characteristics	Probiotic (N19)	Plasebo (N18)	Total (N 37)	p
	Mean (±SD)	Mean (±SD)	Mean (±SD)	
	Med (min max)	Med (min max)	Med (min max)	
Age	45.47 (±7.93)	45.78 (±10.20)	45.62 (±8.983)	0.379 ^a
18-40 years	5(26.32)	4(22.22)	9 (24.32)	
41-60 years	14(73.68)	14(77.78)	28(75.68)	
Sex				
Male	9(47.37)	10(55.56)	19(51.35)	
Female	10(52.63)	8(44.44)	18 (48.65)	
Education				
Primary	3(15.79)	3(16.67)	6 (12.22)	
Secondary	14(73.68)	10(55.56)	24 (64.86)	
Bachelor	2(10.53)	5(27.78)	7 (18.92)	
BMI	20.82±2.59	20.184±3.96	20.51±3.29	0.286 ^a
Underweight	9(31.58)	7(38.88)	13 (35.13)	
Normoweight	8(42.1)	9(50)	17 (45.95)	
Overweight	5(26.32)	1(5.56)	6 (12.22)	
Obese	-	1(5.56)	1(2.70)	
Type				
Adenocarcinoma	18(94.74)	16(88.89)	34 (91.89)	
Signet ring cell Carcinoma	1(5.26)	2(11.11)	3 (8.10)	
Location				
Colon	9(47.37)	9(50)	18 (48.68)	
Rectum	7(36.84)	8(44.44)	15 (40.54)	
Rectosigmoid	3(15.79)	1(5.56)	4 (10.81)	
Stage				
Non Metastases	9(47.37)	9(50.00)	18 (48.65)	
Metastases	10(52.36)	9(50.00)	19 (51.35)	
Chemotherapeutic agent				
FUFA	2(10.53)	2(11.11)	4 (10.81)	
FOLFOX	13(68.42)	9(50)	22 (59.46)	
FOLFIRI	3(15.79)	4(22.22)	7 (18.92)	
Oxaliplatin&Capecitabin	1(5.26)	3(16.67)	4 (10.81)	
Duration				
≤ 3 months	10(52.36)	10(55.56)	20 (54.05)	
> 3 months	9(47.37)	8(44.44)	17 (45.94)	

^aIndependent T Test

Most research subjects were 45.62 ± 8.983 years old, male, with secondary education and body mass index (BMI) of 20.51 +3.29 kg/m². The description of colorectal cancer: type of adenocarcinoma, location in the colon, metastatic stage, folfox regimen, and chemotherapy duration of fewer than three months which were primarily found in study subjects.

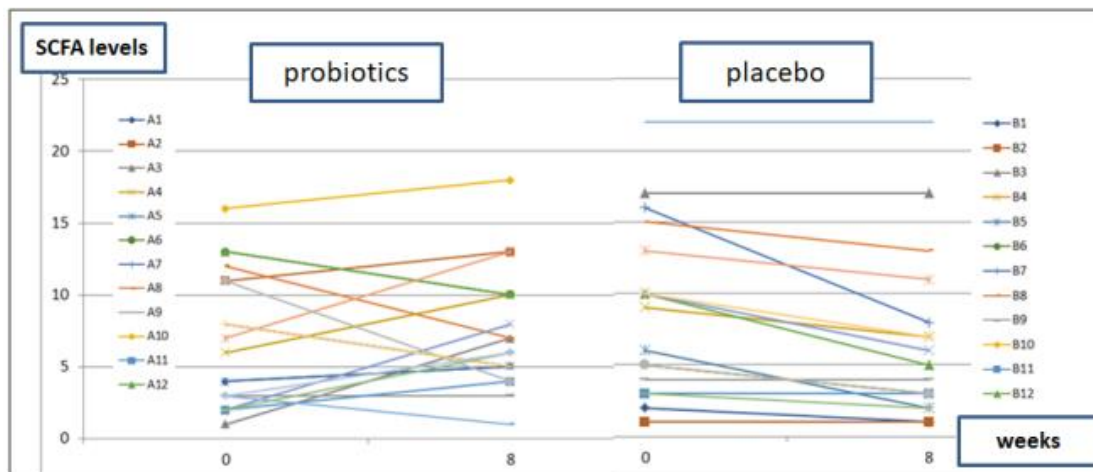


Figure 2. The levels of SCFA in two groups before and after the intervention

Table 2. Probiotics effect on SCFA levels

Variabel	Before		p	After		p	p
	Probiotic	Placebo		Probiotic	Placebo		
	Mean (\pm SD) Med (min-max)	Mean (\pm SD) Med (min max)		Mean (\pm SD) Med (min max)	Mean (\pm SD) Med (min max)		
SCFA levels (mg/mL)	6,79 (\pm 4,65)	8,67 (\pm 5,95)	0,291 ^a	7,37 (\pm 4,16)	4,50 (1-20)	0,230 ^a	0.001 ^b

^aIndependent T test

^bPearson test

4. Discussion

Colorectal cancer in 2020 was the third rank of cancer in the world, and intestinal dysbiosis is considered to play a role in the pathogenesis of colorectal cancer and also as a result of the therapy given, including chemotherapy. Due to the decrease in intestinal commensal microbes, the products produced by these microbes also decrease, and SCFA is one of them. SCFA is produced from daily fibre fermentation with the help of commensal microbes on probiotics. Various important roles that SCFA has include correcting the side effects of chemotherapy, both local in the intestine and systemic. (Osterlund, et al. 2020)

In this study, data were obtained in two groups, age 45.47 (\pm 7.93) years VS 45.78 (\pm 10.20) years, BMI 20.82 (\pm 2.59) years VS 20.18 (\pm 3,98) kg/m². This is in accordance with the current theory, where at the age of 40 years, the risk of colorectal cancer will increase. Secondary education, adenocarcinoma, location in the colon, metastatic stage, FOLFOX regimen, and duration of chemo less than 3 months were the most common in subjects. (American cancer society. About colorectal cancer.2020)

The levels of SCFA at the beginning of the research were 6.75 (\pm 4.65) mg/ml and 8.67 (\pm 5.95) mg/ml with a p-value of 0.291. There was no significant difference between the two groups. After the intervention, there was an increase in SCFA levels to 7.37, while in placebo, there was a decrease in SCFA, with a p-value of 0.001, meaning that there was a significant difference between the two groups. An increase in SCFA levels was found in Ohara's study with probiotics for five weeks, while Kusumo et al. also got the same results after supplementing with Lactobacillus Plantarum when compared to a placebo. (Ohara, 2018; Kusumo, 2019)

The increase in SCFA levels was not as much as with other studies because the intervention only provided commensal microbes, not accompanied by a substrate as fermentation material. This is the limitation of our study, and the number of dropout samples is 15%.

5. Conclusion

This study aimed to examine the effect of probiotics on SCFA levels in faeces in colorectal cancer patients undergoing chemotherapy at RSMH Palembang. The results of the study revealed that giving probiotics can increase sofa stool levels in colorectal patients who are undergoing chemotherapy. Further research can be carried out to investigate the effect of probiotics on increasing SCFA during an entire course of chemotherapy, as well as giving probiotics and daily fibre simultaneously.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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