Effect of Fecal Microbiota Transplant versus Conventional Medications in Treatment of Irritable Bowel Syndrome

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Background and study aim: Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder with 10%-15% prevalence. Altered intestinal microflora is common in IBS so the current study aims to figure out the effect of fecal microbiota transplant (FMT) on patients suffering from IBS.

Patients and Methods: The study included 30 patients attended internal medicine clinic of the Suez Canal University Hospital, Ismailia, Egypt. All were inquired about IBS symptoms using Rome III criteria, patients classified into three groups: group A: healthy donors, group B: patients who received Mebeverine and Simethicone and group C: patients who managed by FMT. Patients were asked to register their symptoms using the IBS-severity scoring system (IBS- SSS) after 2 weeks and one month. The stool for FMT of the donors was prepared and introduced to patients via retention enema.

Results: Significant improvement of quality of life (QoL) in group B was 47.74 ± 40.43% after 2 weeks and 26.14 ± 50.28% after one month. In group C, the improvement was 82.57 ± 20.94% after 2 weeks that became 79.57 ± 21.49% after one month. The pain score before treatment was 70 in group B and 75 in group C then after 2 weeks pain score was 35 in group B and 20 in group C and after one month pain score was 70 in group B and 20 in group C. Patients in both groups B and C have constipation that improved markedly in group C more than group B.

Conclusion: FMT is a good method of treatment of IBS patients .

INTRODUCTION

Irritable bowel syndrome (IBS) is defined as abdominal pain and discomfort with altered bowel habits in the absence of any other mechanical, inflammatory, or biochemical explanation for these symptoms **[1]**. IBS is a chronic condition that severely impacts the quality of life of affected individuals **[2]**. It is the most common functional digestive disorder. The prevalence of IBS is ranged between 10-20 % worldwide **[3]**. IBS is thought to have a complex etiology that involves changes in gastro-intestinal motility, small- bowel bacterial overgrowth, microscopic inflammation, and visceral hypersensitivity, according to recent study **[4]**. IBS has been linked to bacterial overgrowth in the small intestine. In patients with bacterial overgrowth, the main migratory complex is reduced **[5]**.

Because there are no cures for IBS, treatment is palliative and supportive, focusing on individual symptoms, yet it is notoriously unsatisfactory **[6]**. Intestinal microbiota has been found to be altered in IBS patients, as well as an increase in symptoms following enteric infections, suggesting that restoring intestinal microflora may be a good therapeutic target **[7,8]**. Different treatment options for IBS include dietary manipulation, peppermint oil, antispasmodics, loperamide, antidepressants, psychological therapies including hypnotherapy, serotonergic agents, prosecretory agents, antibiotics; rifaximin and modifying the colonic microbiota: probiotics, prebiotics **[9]**.

A fecal microbiota transplantation (FMT) is the transfer of fecal material containing bacteria and natural antibacterial from a healthy individual into a diseased recipient. These terminologies have been replaced by the new term faecal microbiota transplantation because the technique involves the total restoration of the entire faecal microbiota, not just a single agent or combination of agents **[10]**. FMT involves re-establishing healthy bacterial Flora in the colon by infusing faeces, e.g., by enema, orogastric tube, or orally in the form of a capsule containing freeze-dried material taken from a healthy donor **[11]**. Other gastrointestinal illnesses, such as colitis, constipation, and IBS, have been treated with FMT on experimental basis. **[12]**. Autoimmune disorders, obesity, metabolic syndrome and diabetes **[13]**, and neurological conditions such as multiple sclerosis and Parkinson's disease can also modulated by FMT **[14]**. The current study aims to figure out the effect of fecal microbiota transplant and conventional medications among patient suffering from IBS.

PATIENTS AND METHODS

This is a comparative cross sectional study This clinical trial study was carried out at the internal medicine clinic of the Suez Canal University Hospital, Ismailia, Egypt. The study included 30 patients aging 19 - 60 years of both female and male gender who were inquired about IBS symptoms using Rome III criteria **[15]** and divided to 3 groups (A, B and C), 10 patients in each group.

Group A: (control group) healthy individual and they were the donors.

Group B: patients who suffer from IBS and received conventional medications.

Group C: patients who suffer from IBS and was managed by fecal microbiota transplant (FMT). All were selected by convenience sampling after approval and signing an informed consent. Participants responded to a short questionnaire including sociodemographic data. In the Suez Canal University Hospital's internal medicine clinic, IBS patients were diagnosed using the Rome III criteria after ruling out any other organic bowel disease. Rome III criteria: recurrent abdominal discomfort that occurs at least once a week on average during the previous three months and is associated with two or more of the following:

- Symptoms linked to defecation (increased or unaltered)
- Symptoms associated with a change in stool frequency;
- Symptoms associated with a change in stool form or appearance.

All patients were seen for study visits at baseline, 2 weeks and 1 month, where they completed the IBS-severity scoring system (IBS- SSS) and all the patients who didn't commit with the 3 visits were excluded from the study. **[16]**

Conventional medications (commonly used drugs) [17]

Mebeverine 135 mg tab 3 times per day and Simethicone chewable tab 3 times per day.

Administration of Donor Material Donors

Three faecal donors were recruited in the study. All donors were screened according to standard guidelines for FMT donors **[18]**, and were recruited according to criteria described in detail elsewhere **[19]**. In summary, the three donors were healthy adults aged between 18–45 years with no current medicine consumption. Furthermore, the donors were characterized by having normal bowel movements, defined as 1–2 bowel movements per day of type 3–4 on the Bristol Stool Form Scale (BSFS) **[20]**.

Donor material

The evening before the fecal transplant, the donor takes a laxative at bedtime. On the morning of the procedure, the donor collects a fistful-sized amount of stool which equals approximately 200–300 grams of fecal material. The specimen was dissolved with saline then filtered by doubled gauze layer for particles. For transport, it was stored in a clean, plastic container, kept cool and it was transplanted within 6 to 8 hours **[21]**.

Procedure of FMT

Patients underwent bowel lavage and 100–150 mL of the donor fecal suspension (corresponding to approximately 50 g stool) was transferred via a rectal enema. Participants were asked to lie on their left side for 30 minutes after the enema. After the transfers, patients were given 2 mg loperamide, an opoid-receptor agonist, for 3 days to reduce bowel movements **[22]**.

Methods of data collection

All persons included in the study were submitted to the following scheme pre and post intervention:

1) Questionnaire

   Data will be collected by structured interview. According to items:

   Basic demographic data (age, sex,…….).

   Stool test to screen for parasites or ova (eggs), protozoa as Entamoeba histolytica which is more common also cause diarrheal illness.

2) Abdominal ultrasound to assess the liver, gall bladder and kidney condition.

3) Blood tests for thyroid stimulating hormone (TSH), random blood sugar (RBS), alanine aminotransferase (ALT), aspartate aminotransferase (AST) and serum creatinine were done to exclude other cause which can explain the patient's symptoms.

Statistical analysis [23][24]

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level.

RESULTS:

The study included 30 patients with IBS. Male to female ratio was 1:2, of which 21 patients were from Urban areas (table 1). When comparing the 3 groups according to body mass index most of (IBS patients) were obese (7 in group C and 4 in group B) and (2 only in group A) (table 1).

Most of the patients in group B were constipation predominate (7 patients) and the others were alternative (3 patients), while in group C most of them were alternative type (6 patients) and others are constipation predominate (table 2).

Effect of FMT

***Abdominal symptoms and quality of life**

Abdominal symptoms as measured using IBS-SSS were significantly improved after 2 weeks and 1 month for both groups B and C, The improvement in IBSSSS in group B was 41.48 ± 30.04% after 2 weeks that became 15.74 ± 31.08% after 1 month with significance between both results and between results before treatment and results 2 weeks after, but there's no significance when compare results before treatment and one month after treatment (figure 1).

In more detail, after 2 weeks, there were clinical improvements in the pain score of 46.67 and 85.18 of the patients in group B and group C, respectively, and became 21.64 and 80.77 after one month (table 3). The improvement in the quality of life was 47.74 and 82.57 in group B and group C, respectively after 2 weeks while it became 26.14 and 79.57 after 1 month (figure 2).

*** Post prandial abdominal pain**

Before treatment there's 8 patients developed abdominal pain after eating Most and some of the time in group B and 9 patients in group C with highly significant differences between groups. After 2 weeks there's 2 patients in both groups (B and C) still have abdominal pain after eating without significance between groups. One month after treatment there's 5 patients in group B and 3 in group C had abdominal pain after eating without significance between groups (table 5).

***Bowel habits and flatulence**

The studied population has a constipation-predominant which was markedly improved in group C more than group B, 50.37% and 21.14% respectively (table 4). Regarding flatulence, there’s improvement in group B and group C when compare each group with base line data but no intergroup significance, in more details; The median of the score is 80 before treatment in group B and 70 in group C, with non-significant difference but with significant difference if compare each group with control. After 2 weeks score decrease markedly in both groups to be 40 and 20 in group B and C respectively with non-significant difference, but with significant difference if compared each one with control group. One month after, score became 70 in group B and 25 in group C and also there's no statistically significant difference between them, but it shows significant difference if compared each one with control group (table 6).

Table (1): Comparison between the different studied groups according to demographic data.

	Group A (n= 10)		Group B (n= 10)		Group C (n= 10)		Test of sig.	p
	No.	%	No.	%	No.	%		
Sex								
Male	7	70.0	1	10.0	2	20.0	χ^2- 8.469	0.025*
Female	3	30.0	9	90.0	8	80.0		
Age (years)								
Min. – Max.	18.0 – 65.0		33.0 – 60.0		33.0 – 59.0			
Mean ± SD.	35.60 ± 13.72		41.0 ± 9.72		44.50 ± 11.10		F=1.486	0.244
Median	33.50		36.50		40.50			
BMI (kg/m^2)								
Under (>18.5)	0	0.0	0	0.0	0	0.0		
Normal (18.5 – 24)	4	40.0	4	40.0	2	20.0	χ^2- 5.376	^{MC}p= 0.252
Over (25 – 29.9)	4	40.0	2	20.0	1	10.0		
Obese (>30)	2	20.0	4	40.0	7	70.0		
Min. – Max.	22.0 – 33.0		20.0 – 35.0		23.0 – 37.0			
Mean ± SD.	27.0 ± 3.88		27.70 ± 5.85		30.54 ± 4.65		F=1.487	0.244
Median	26.85		28.50		32.15			
Address								
Urban	8	80.0	6	60.0	7	70.0	χ^2- 1.009	^{MC}p= 0.877
Rural	2	20.0	4	40.0	3	30.0		
Marital status								
Married	7	70.0	3	30.0	6	60.0		
Single	3	30.0	3	30.0	1	10.0	χ^2- 7.906	^{MC}p= 0.200
Divorced	0	0.0	3	30.0	3	30.0		
Widow	0	0.0	1	10.0	0	0.0		
Habits								
Non – smoking	7	70.0	8	80.0	8	80.0	χ^2- 0.511	^{MC}p= 1.000
Smoking	3	30.0	2	20.0	2	20.0		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the three groups
F,p: F and p values for **ANOVA test**
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the three groups
*: Statistically significant at $p \leq 0.05$
Statistical significance was assessed by non-parametric Mann-Whitney test or Student t test (for fecal calprotectin); gender distribution was analyzed by a chi-square test.
IBS, irritable bowel syndrome patients; FMT, fecal microbiota transplantation; IBS-D, IBS with diarrhea; IBS-C, IBS with constipation.

Table (2): Comparison between the two studied groups according to IBS type.

IBS type	Group B (n= 10)		Group C (n= 10)		χ^2	^{FE}p
	No.	%	No.	%		
Before treatment						
Alternative	3	30.0	6	60.0		
Diarrhea predominate	0	0.0	0	0.0	1.818	0.370
Constipation predominate	7	70.0	4	40.0		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the two groups
^{FE}p**:** p value for **Fisher Exact** for Chi square test for comparing between the two groups
*: Statistically significant at $p \leq 0.05$

Table (3): Comparison between the different studied groups according to abdominal pain.

Abdominal pain	Group A (n= 10)		Group B (n= 10)		Group C (n= 10)		χ^2	^{MC}p
	No.	%	No.	%	No.	%		
Before treatment								
Most of the time	0	0.0	8	80.0	9	90.0	29.700*	<0.001*
Some of the time	0	0.0	2	20.0	1	10.0		
Little of the time	1	10.0	0	0.0	0	0.0		
None of the time	9	90.0	0	0.0	0	0.0		
2 weeks after treatment								
Most of the time	0	0.0	1	10.0	2	20.0	12.609*	0.017*
Some of the time	0	0.0	3	30.0	0	0.0		
Little of the time	2	20.0	5	50.0	4	40.0		
None of the time	8	80.0	1	10.0	4	40.0		
1 month after treatment								
Most of the time	0	0.0	5	50.0	3	30.0	25.198*	<0.001*
Some of the time	0	0.0	2	20.0	0	0.0		
Little of the time	0	0.0	3	30.0	5	50.0		
None of the time	10	100.0	0	0.0	2	20.0		
Pain score							**H**	**p**
Before treatment								
Min. – Max.	0.0 – 10.0		50.0 – 80.0		50.0 – 80.0		21.246*	<0.001*
Mean ± SD.	1.0 ± 3.16		69.0 ± 11.01		73.0 ± 9.49			
Median	0.0		70.0		75.0			
Sig. between groups	p_1<0.001*,p_2<0.001*,p_3=0.544							
2 weeks after treatment								
Min. – Max.	0.0 – 10.0		0.0 – 70.0		0.0 – 80.0		12.337*	0.002*
Mean ± SD.	2.0 ± 4.22		38.0 ± 24.86		24.0 ± 30.98			
Median	0.0		35.0		20.0			
Sig. between groups	p_1<0.001*,p_2=0.032*,p_3=0.181							
1 month after treatment								
Min. – Max.	0.0 – 0.0		20.0 – 80.0		0.0 – 80.0		19.099*	<0.001*
Mean ± SD.	0.0 ± 0.0		60.0 ± 21.60		33.0 ± 33.35			
Median	0.0		70.0		20.0			
Sig. between groups	p_1<0.001*,p_2=0.004*,p_3=0.146							

*: Statistically significant at $p \leq 0.05$

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the three groups

^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the three groups

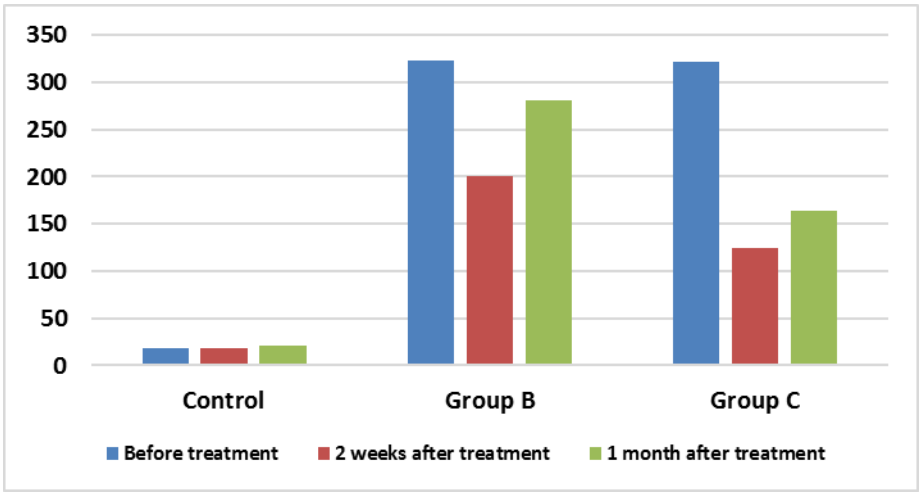

Figure (1): Comparison between the different studied groups according to IBSSS

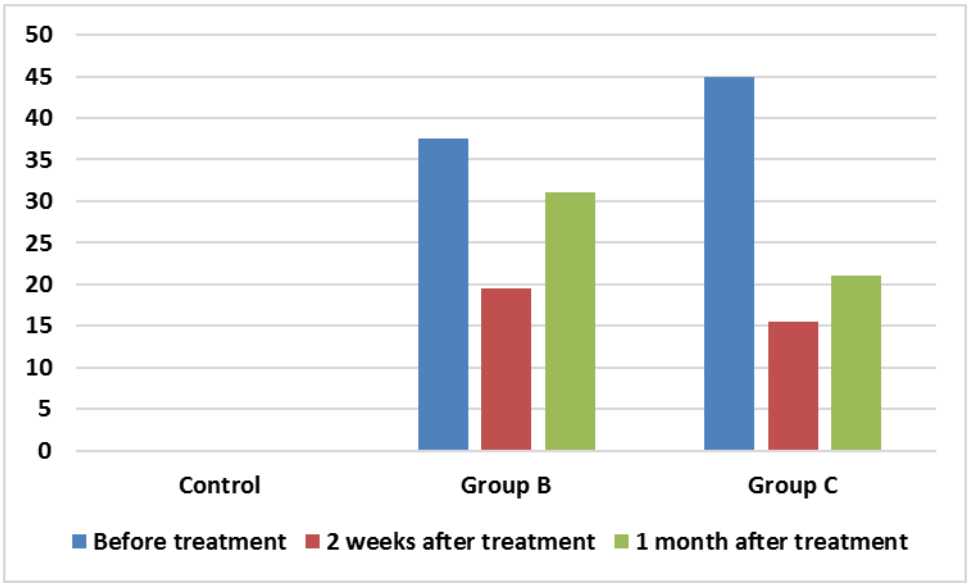

Figure (2): Comparison between the different studied groups according to quality of life (QOL) score (before, 2 weeks and after treatment).

Table (4): Comparison between the different studied groups according to bowel habits.

Diarrhea	Group A (n= 10)		Group B (n= 10)		Group C (n= 10)		χ^2	^{MC}p
	No.	%	No.	%	No.	%		
Before treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	0	0.0	0	0.0		
Some of the time	0	0.0	2	20.0	6	60.0	10.785*	0.011*
Little of the time	1	10.0	3	30.0	1	10.0		
None of the time	9	90.0	5	50.0	3	30.0		
2 weeks after treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	0	0.0	0	0.0		
Some of the time	0	0.0	1	10.0	1	10.0	5.670	0.136
Little of the time	1	10.0	3	10.0	5	50.0		
None of the time	9	90.0	6	60.0	4	40.0		
1 month after treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	0	0.0	0	0.0		
Some of the time	0	0.0	1	10.0	1	10.0	10.265*	0.019*
Little of the time	1	10.0	3	30.0	7	70.0		
None of the time	9	90.0	6	60.0	2	20.0		
Constipation								
Before treatment								
All the time	0	0.0	3	30.0	1	10.0		
Most of the time	0	0.0	3	30.0	3	30.0		
Some of the time	1	10.0	3	30.0	6	60.0	21.124*	<0.001*
Little of the time	4	40.0	1	10.0	0	0.0		
None of the time	5	50.0	0	0.0	0	0.0		
2 weeks after treatment								
All the time	0	0.0	3	30.0	0	0.0		
Most of the time	0	0.0	1	10.0	1	10.0		
Some of the time	1	10.0	3	30.0	2	20.0	15.341*	0.009*
Little of the time	4	40.0	3	30.0	7	70.0		
None of the time	5	50.0	0	0.0	0	0.0		
1 month after treatment								
All the time	0	0.0	3	30.0	0	0.0		
Most of the time	0	0.0	4	40.0	3	30.0		
Some of the time	1	10.0	1	10.0	1	10.0	17.730*	0.003*
Little of the time	4	40.0	2	20.0	6	60.0		
None of the time	5	50.0	0	0.0	0	0.0		

*: Statistically significant at $p \leq 0.05$

H, p: H and p values for **Kruskal Wallis test**, Sig. between groups was done using **Post Hoc Test (Dunn's multiple comparisons test)**

p_1: p value for comparing between control and Group B

p_2: p value for f comparing between control and Group C

p_3: p value for comparing between Group B and Group C

Table (5): Comparison between the different studied groups according to presence of pain after eating.

Pain after eating	Control (n= 10)		Group B (n= 10)		Group C (n= 10)		χ^2	^{MC}p
	No.	%	No.	%	No.	%		
Before treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	2	20.0	2	20.0		
Some of the time	0	0.0	6	60.0	7	70.0	20.443*	<0.001*
Little of the time	3	30.0	1	10.0	1	10.0		
None of the time	7	70.0	1	10.0	0	0.0		
2 weeks after treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	0	0.0	0	0.0		
Some of the time	0	0.0	2	20.0	2	20.0	4.579	0.344
Little of the time	4	40.0	6	60.0	5	50.0		
None of the time	6	60.0	2	20.0	3	30.0		
1 month after treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	0	0.0	1	10.0		
Some of the time	0	0.0	5	50.0	2	20.0	8.563	0.154
Little of the time	6	60.0	3	30.0	4	40.0		
None of the time	4	40.0	2	20.0	3	30.0		

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the three groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the three groups
*: Statistically significant at $p \leq 0.05$.

Table (6): Comparison between the different studied groups according to flatulence.

Flatulence	Group A (n= 10)		Group B (n= 10)		Group C (n= 10)		χ^2	^{MC}p
	No.	%	No.	%	No.	%		
Before treatment								
All the time	0	0.0	2	20.0	1	10.0		
Most of the time	0	0.0	8	80.0	8	80.0		
Some of the time	0	0.0	0	0.0	1	10.0	28.670*	<0.001*
Little of the time	5	50.0	0	0.0	0	0.0		
None of the time	5	50.0	0	0.0	0	0.0		
2 weeks after treatment								
All the time	0	0.0	0	0.0	0	0.0		
Most of the time	0	0.0	2	20.0	1	10.0		
Some of the time	0	0.0	3	30.0	2	20.0	8.734	0.151
Little of the time	4	40.0	4	40.0	5	50.0		
None of the time	6	60.0	1	10.0	2	20.0		
1 month after treatment								
All the time	0	0.0	1	10.0	0	0.0		
Most of the time	0	0.0	5	50.0	3	30.0		
Some of the time	0	0.0	2	20.0	1	10.0	15.552*	0.007*
Little of the time	7	70.0	2	20.0	6	60.0		
None of the time	3	30.0	0	0.0	0	0.0		
Flatulence score								
Before treatment	0.0		80.0		70.0			<0.001*
2 weeks after treatment	0.0		40.0		20.0			0.001*
1 month after treatment	20.0		70.0		25.0			<0.001*

χ^2, p: χ^2 and p values for **Chi square test** for comparing between the three groups
^{MC}p: p value for **Monte Carlo** for Chi square test for comparing between the three groups
*: Statistically significant at $p \leq 0.05$.

DISCUSSION

This study aimed to identify the effect of fecal microbiota transplant versus conventional medications among patient suffering from IBS. Current evidence suggests the microbiota of the GI tract plays a substantial role in the aetiology of IBS. This is supported by several factors: IBS symptoms appear after an infectious gastroenteritis, temporary discomfort improvement following antibiotic **[25]**. The favourable benefits of FMT on IBS- related symptoms were attributed by Holvoet et al **[26]** to changes in the microbiota. Furthermore, antibiotics that are taken orally and are poorly absorbed by the GI system cause a temporary reduction in symptoms **[27]**.

The Findings of this study show that FMT is an effective treatment for IBS that improves both the symptoms and quality of life, about half of the patients experienced significant clinical improvements in abdominal symptoms and quality of life. In addition, results mirror findings of the treatment effect on gastro-intestinal complaints by the IBS-SSS **[28]**.

Regarding abdominal pain; all the patients in IBS groups (B and C) experienced abdominal pain before treatment which markedly decreased after 2 weeks in both groups B and C and also after one month, this improvement which occurred after FMT was matched with many studies: Andrews et al found that FMT using fecal enema infusions, 89% of whom (40 of 45 patients) reported relief in

abdominal pain immediately after the procedure **[29]**.

Other study of 13 patients at Montefiore Medical Center in New York City who underwent FMT for refractory IBS after interventions of dietary modification, probiotics, antibiotics, and/or anti-depressants had failed (9 IBS-diarrheal, 3 IBS-constipated, 1 IBS-mixed), 70% of patients reported improvement or resolution of symptoms and decrease of abdominal pain 72% **[30]**.

Mazzawi et al conducted a study with FMT in IBS-D patients [9 patients) according to the Rome III criteria in order to investigate the effect of FMT on symptoms and the density of duodenal enteroendocrine cells **[31]**. The IBS severity score and the IBS symptom questionnaire were completed before and 3 weeks after FMT. Abdominal pain scores were significantly reduced 3 weeks after FMT treatment (P = 0.005) **[32]**.

In contrast of our study that shows significant relief in abdominal pain after mebeverine and simethicone treatment, a randomized trial, revealed that clinical improvement and relief of abdominal pain by mebeverine treatment were not statistically significant compared to placebo **[33, 34]**.

There were no published studies about the effect of mebeverine and simethicone combination on the symptoms of IBS but there was meta-analysis found that by adding simethicone to mebeverine was more effective on relieving IBS symptoms more than mebeverine alone **[32]**.

In our study, patients who had diarrhea, after FMT there was improvement which remains after one month from the procedure.

Regarding to the improvement through FMT our study was matched with Mazzawi et al whose investigated the effect of FMT on symptoms and the density of duodenal enteroendocrine cells in IBS- D patients. Nine patients were included according to the Rome III criteria published that there was improvement regarding diarrhea with P value (P = 0.0002) **[34]**. Lu et al was another study was matched with our study that showed a significant improvement in stool consistency after mebeverine treatment at 2 weeks ($p < 0.01$), with a significant reduction in daily defecation frequency ($p < 0.05$) **[36]**.

Most of the patients in groups C improved markedly after 2 weeks and one month after FMT matched with Andrews et al whose published that 60% of patients had normal defecation, without laxative use which persisted 9 to 19 months later **[29]**.

Also, Mazzawi et al conducted a study with FMT in IBS-D patients in 9 patients were included according to the Rome III criteria.

Constipation was significantly reduced 3 weeks after FMT treatment with p value (p = 0.02] **[34]**.

In our study, in group B there was improvement of flatulence in 50% of the patients after 2 weeks and 70% in group C and no statistically significant difference between them, but it shows significant difference if compared with control group. This was nearly matched with Pinn et al as they treat 13 patients with refractory IBS with FMT through enema and reported that 70% of patients improved from Clatulence by 45% **[38]**. In 2015, Cruz Aguilar et al published an abstract about the treatment and results of 9 patients suffering from IBS (diagnosis depend on Rome III) treated with single FMT through a colonoscopy. Evaluation of the treatment was performed 3 months after FMT using a standardized questionnaire and clinical evaluation. A 50% reduction in bloating was reported by 16% of the participants. Reduction of symptoms lasted only 8 weeks after FMT before a gradual reinstatement of symptoms occurred **[39]**.

In our study and all mentioned studies report improvement after FMT with different percentages which may be explained as the assessment methods were subjective (questionnaire) not objective and to approve these results objective measurement as PCR was needed to measure type and number of microbiota before and after FMT.

Poynard et al., a meta-analysis of 26 selected double-blind randomized trials vs. placebo not consistent with our study that aimed to assess the efficacy of smooth muscle relaxants (mebeverine) in the treatment of patients with irritable bowel syndrome, reported that no significant differences were observed for abdominal distension when using mebeverine as treatment for IBS **[40]**.

A marked improvement in QoL in group B and C and after one month the improvement in group C was nearly as the same as after 2 weeks while in group B became nearly same as before treatment without significance between both and significance observed if compare each one with control group. This is also consistent with earlier reporting of IBS-related QoL **[41]**. Our findings back up prior research that suggests that in a subpopulation of IBS, depression is caused by the

gut rather than the brain. In around half of the instances, IBS symptoms appear first, with psychological anguish appearing afterwards **[42]**.

Furthermore, a 2017 randomized controlled research indicated that probiotics improved depression scores and altered brain activity in IBS patients **[43]**.

Monnikes et al was another study that not consistent with our study and found in IBS patients who treated for 8 weeks with mebeverine, QoL score was significantly improved by 44% and the mean ($p<0.001$) **[55]**, Another prospective observational cohort study showed that the treatment with mebeverine hydrochloride improved the QOL **[44]**.

Improvement of IBSSSS in our patients is consistent with Hong et al who published an abstract on FMT treatment in 10 patients with moderate IBS that did not respond to traditional treatment. Patients answered the IBS severity score before as well as 1 and 3 months after FMT. Study outcomes included the length of symptom-free intervals, bloating, flatus, and abdominal pain, frequency of bowel movements, dyspepsia, and overall well-being before and after FMT. Eighty percent of the study participants experienced resolution or improvement of symptoms after FMT. Clinically significant improvements in IBS severity score were observed at only 1 month follow-up after FMT (132 ± 100) compared to baseline (252 ± 122) ($p= 0.027$). However, tend to return to their pre-treatment state within 3 months after FMT **[45]**.

Syzenko et al published an abstract in 2016 on a study evaluating the effect of FMT in "treatment resistant" IBS patients. The results showed an abdominal pain resolution or significant improvement in 9 (75%) patients ($p \leq 0.01$). Only 1 patient reported no change in pain level **[35]**.

The main strength of this study is the complete characterization of participants at baseline and the further follow-up that allowed for novel discoveries about possible long-term effects of FMT treatment. There are some weaknesses in this study. We highlight a few of the most important: Although the safety profile is not evaluated in this study, however no major adverse events related to faecal matter in transplants have been documented in previous studies.

In Conclusion, using fecal microbiota transplant (FMT) as a method of treatment of IBS is an effective choice.

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Ethical aspect:

The study was approved by the institutional ethical committee at Suez Canal University, Faculty of Medicine. The title, aim, and benefits of the study were explained individually to each participant and after approval, an informed consent was obtained from each participant.

Research Highlights:

1. FMT can change the gut microbiota in patients with IBS.
2. This study highlights the potential role of microbiota manipulations in IBS.
3. It also highlights the importance of the donor microbiota for treatment success.
4. A strategy to select appropriate donors and maximize donor-host microbiome compatibility for a beneficial treatment success still needs to be developed.

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