

1 **Supplementary Material**

2 **Table S1:** Inclusion criteria: Rome IV criteria for functional constipation

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- 1) Age: 19 to 75 years
  - 2) More than two of the following symptoms of functional constipation in the last 3 months:
    - (i) Fewer than three bowel movements a week
    - (ii) Hard or lumpy stools in more than 1/4 defecations
    - (iii) Straining during a bowel movement in more than 1/4 defecations
    - (iv) Sensation of incomplete evacuation in more than 1/4 defecations
    - (v) Sensation of anorectal obstruction/blockade in more than 1/4 defecations
    - (vi) Manual maneuvers to facilitate more than 1/4 defecations
  - 3) Loose stools are not present and there are insufficient Rome IV criteria for irritable bowel syndrome
  - 4) Intestinal transit time > 36 h
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4 **Table S2:** Exclusion criteria

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- 1) Felt abdominal pain or discomfort at least once a week and more than the following two symptoms matching the Rome IV criteria of irritable bowel syndrome in the last 3 months:
    - (i) Abdominal pain or discomfort that improves or disappears after a bowel movement
    - (ii) A change in the number of bowel movements with the onset of abdominal pain or discomfort
    - (iii) Changes in stool consistency with the onset of abdominal pain or discomfort
  - 2) Intestinal or gallbladder resection surgery
  - 3) Organic gastrointestinal disease
  - 4) Abnormal results of colonoscopy or radiologic tests within the preceding 3 years
  - 5) Diagnosed with one of the following diseases: endocrine disorders (diabetes), malignant tumors, renal failure, hepatic failure
  - 6) Abnormal results of one of the following tests:
    - (i) aspartate transaminase/alanine transaminase more than two times upper normal limits
    - (2) Creatinine > 2.0 mg/dL
  - 7) Within the preceding 2 weeks, taken medicines (antibiotics, antidiarrheals, laxatives, etc.) or health functional foods (probiotics, probiotics, fibers, etc.) that may affect digestive tract movement
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| Characteristic            | Treatment (n = 34) | Control (n = 29) | Total (n = 63)  | p-value |
|---------------------------|--------------------|------------------|-----------------|---------|
| Gender                    |                    |                  |                 | 1.0000  |
| Male                      | 5 (14.7)           | 4 (13.8)         | 9 (14.3)        |         |
| Female                    | 29 (85.3)          | 25 (86.2)        | 54 (85.7)       |         |
| Age (years)               | 36.41 ± 14.90      | 34.55 ± 13.55    | 35.48 ± 14.23   | 0.6086  |
| Dietary intakes           |                    |                  |                 |         |
| Energy (kcal)             | 1351.08 ± 722.13   | 1332.98±492.74   | 1342.03±607.44  | 0.9095  |
| Carbohydrate (g)          | 208.77 ± 132.75    | 205.28 ± 88.87   | 207.03 ± 110.81 | 0.9071  |
| Fat (g)                   | 35.13 ± 18.73      | 34.60 ± 14.51    | 34.87 ± 16.62   | 0.9010  |
| Vegetable (g)             | 18.51 ± 11.73      | 18.40 ± 8.26     | 18.46 ± 10.00   | 0.9641  |
| Animal (g)                | 16.62 ± 10.07      | 16.20 ± 10.21    | 16.41 ± 10.14   | 0.8712  |
| Protein (g)               | 45.84 ± 22.94      | 45.85 ± 17.15    | 45.85 ± 20.05   | 0.9987  |
| Fiber (g)                 | 13.21 ± 10.31      | 12.87 ± 5.76     | 13.04 ± 8.04    | 0.8707  |
| Moisture (g)              | 532.31 ± 273.40    | 476.49 ± 211.32  | 504.40 ± 242.36 | 0.3744  |
| Alcohol consumption       |                    |                  |                 | 0.1990  |
| Non-drinker               | 17 (50.0)          | 20 (69.0)        | 37 (58.7)       |         |
| Drinker                   | 17 (50.0)          | 9 (31.0)         | 26 (41.3)       |         |
| Smoking status            |                    |                  |                 | 0.092   |
| Non-smoker                | 34 (100.0)         | 26 (89.7)        | 60 (95.2)       |         |
| Smoker                    | 0 (0.0)            | 3 (10.3)         | 3 (4.8)         |         |
| Caffeinated drinks intake |                    |                  |                 | 0.1286  |
| Never                     | 2 (5.9)            | 6 (20.7)         | 8 (12.7)        |         |
| 1/day or more             | 32 (94.1)          | 23 (79.3)        | 55 (87.3)       |         |

7 **Table S3:** Baseline characteristics of the subjects.

8 Values are presented as number (%) or mean ± standard deviation; p-values are based on Fisher's exact  
9 test.

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12 **Table S4:** Severity of adverse effects

| Severity | Treatment (n = 34), n (%) | Control (n = 29), n (%) |
|----------|---------------------------|-------------------------|
| Mild     | 2 (5.9)                   | 2 (6.9)                 |
| Moderate | 0                         | 1 (3.4)                 |
| Severe   | 0                         | 0                       |

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14 **Table S5:** Vital signs, weight, and body mass index (BMI) of the subjects.

|                          |          | Treatment (n = 34), mean ± SD | Control (n = 29), mean ± SD | p-value |
|--------------------------|----------|-------------------------------|-----------------------------|---------|
| SBP (mmHg)               | Baseline | 119.68 ± 17.03                | 113.66 ± 12.89              | 0.1239  |
|                          | 4 weeks  | 115.15 ± 16.49                | 113.55 ± 12.34              | 0.6698  |
| DBP (mmHg)               | Baseline | 71.03 ± 12.13                 | 66.66 ± 7.84                | 0.0904  |
|                          | 4 weeks  | 70.85 ± 10.81                 | 67.79 ± 8.22                | 0.2171  |
| Pulse (beats/min)        | Baseline | 82.47 ± 14.82                 | 81.21 ± 11.97               | 0.7142  |
|                          | 4 weeks  | 77.38 ± 11.66                 | 83.59 ± 12.94               | 0.0498* |
| Body temperature (°C)    | Baseline | 36.50 ± 0.12                  | 36.50 ± 0.14                | 0.5849  |
|                          | 4 weeks  | 36.50 ± 0.13                  | 36.45 ± 0.16                | 0.1944  |
| Weight (kg)              | Baseline | 59.07 ± 9.05                  | 59.19 ± 9.15                | 0.8493  |
|                          | 4 weeks  | 58.61 ± 9.94                  | 58.66 ± 9.89                | 0.8250  |
| BMI (kg/m <sup>2</sup> ) | Baseline | 22.45 ± 2.92                  | 22.50 ± 3.02                | 0.6299  |
|                          | 4 weeks  | 22.07 ± 3.43                  | 22.08 ± 3.36                | 0.5999  |

15 SBP, systolic blood pressure; DBP, diastolic blood pressure; SD, standard deviation. p-values are based  
 16 on Fisher's exact test (\*p < 0.05).

18 **Table S6:** Results of hematological analysis.

|                  |          | Treatment (n = 34) | Control (n = 29) | p-value |
|------------------|----------|--------------------|------------------|---------|
| WBC              | Baseline | 0 (0.0)            | 2 (6.9)          | >0.05   |
|                  | 4 weeks  | 1 (2.9)            | 3 (10.3)         | >0.05   |
| RBC              | Baseline | 0 (0.0)            | 1 (3.4)          | >0.05   |
|                  | 4 weeks  | 0 (0.0)            | 1 (3.4)          | >0.05   |
| Hemoglobin       | Baseline | 2 (5.9)            | 1 (3.4)          | >0.05   |
|                  | 4 weeks  | 1 (2.9)            | 1 (3.4)          | >0.05   |
| Hematocrit       | Baseline | 1 (2.9)            | 1 (3.4)          | >0.05   |
|                  | 4 weeks  | 1 (2.9)            | 1 (3.4)          | >0.05   |
| Platelets counts | Baseline | 0 (0.0)            | 0 (0.0)          | >0.05   |
|                  | 4 weeks  | 0 (0.0)            | 0 (0.0)          | >0.05   |

19 WBC, white blood cell count; RBC, red blood cell count.

20 Values are expressed as the number (%) of subjects with abnormal values; p-values are based on

21 Fisher's exact test.

22 **Table S7:** Results of blood chemistry analysis.

|                 |            | Treatment (n = 34) | Control (n = 29) | p-value |
|-----------------|------------|--------------------|------------------|---------|
| Total bilirubin | Baseline   | 0 (0.0)            | 2 (6.9)          | >0.05   |
|                 | Last visit | 1 (2.9)            | 3 (10.3)         | >0.05   |
| ALP             | Baseline   | 0 (0.0)            | 1 (3.4)          | >0.05   |
|                 | Last visit | 0 (0.0)            | 1 (3.4)          | >0.05   |
| AST             | Baseline   | 2 (5.9)            | 1 (3.4)          | >0.05   |
|                 | Last visit | 1 (2.9)            | 1 (3.4)          | >0.05   |
| ALT             | Baseline   | 1 (2.9)            | 1 (3.4)          | >0.05   |
|                 | Last visit | 1 (2.9)            | 1 (3.4)          | >0.05   |
| GGT             | Baseline   | 0 (0.0)            | 0 (0.0)          | >0.05   |
|                 | Last visit | 0 (0.0)            | 0 (0.0)          | >0.05   |

23 ALP, alkaline phosphatase; AST, aspartate transaminase; ALT, alanine transaminase; GGT, gamma-  
 24 glutamyl transferase.

25 Values are expressed as the number (%) of subjects with abnormal values; p-values are based on  
 26 Fisher's exact test.

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