European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejpe.v12i3.5874 Volume 12 | Issue 2 | 2025

A REVIEW AND ANALYSIS OF TREATMENTS FOR CHRONIC CONSTIPATION IN ADULTS

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Abstract:
This article reviews the treatment of chronic constipation (CC) in adults, including pharmacologic therapy, microbiota therapy, conservative interventions, and tai chi. Chronic constipation, a common gastrointestinal disorder, affects patients' physical symptoms, social functioning, and psychological health, as well as increasing healthcare costs. Therapeutic measures aim to improve patient's quality of life and reduce healthcare costs. Pharmacological treatments have been investigated with drugs such as linaclotide, procalcitonin, and lubiprostone, which have shown significant results in improving patients' quality of life, weekly spontaneous bowel movement (SBM) frequency, and chronic idiopathic constipation (CIC) symptoms. Microbiota therapies, including fecal microbiota transplantation (FMT), probiotics, prebiotics, and synbiotics, have shown positive results in increasing bowel frequency and improving stool consistency. For conservative interventions, dietary fiber and abdominal massage are the two main interventions. Dietary fiber has good efficacy in chronic constipation, and abdominal massage can significantly increase the frequency of bowel movements and improve constipation-related symptoms. Tai chi, as a gentle form of exercise, has also been shown to promote intestinal peristalsis, relieve constipation symptoms, and improve patients' quality of life.

Keywords: chronic constipation; prescription drugs; microbiota; dietary fiber; Tai chi

1. Introduction

Chronic constipation (CC) is one of the more common gastrointestinal disorders and is suffered by people of all ages, with an estimated prevalence of about 24%. (1)As mentioned in previous reports, chronic constipation affects approximately 15% of patients worldwide (2, 3). In addition, 14.4% of the general adult population in Mexico has been reported to suffer from chronic constipation (4), and reports from Asian

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countries have also reported that the prevalence of chronic constipation in adults ranges from 15% to 29% (5-7). Chronic constipation differs from constipation in that it is characterized by constipation lasting at least 3 months(8). It is often used to describe symptoms of rare bowel movements, clumped stools, incomplete bowel movements, excessive straining, anal obstruction, and, in some special cases, even the need for manual assistance with bowel movements (9).

The etiology of chronic constipation can be categorized into two types, i.e., primary constipation and secondary constipation. Primary constipation includes functional constipation (FC), chronic idiopathic constipation (CIC), irritable bowel syndrome with constipation (IBS-C), and functional defecation disorders. (10) Functional constipation is an unspecified functional bowel dysfunction. (11) According to Rome IV criteria, the global prevalence of functional constipation is 15.3% (12), and the prevalence of chronic idiopathic constipation (CIC) is 14% (13), which also indicates a generally high incidence of chronic constipation. In addition, secondary constipation is associated with several diseases or medications, such as neurogenic bowel dysfunction and opioid-induced constipation (14). Still, this article focuses on reviewing therapeutic measures regarding primary constipation.

Chronic constipation not only affects physical symptoms but also involves social functioning and mental health aspects, thus significantly affecting the quality of life of patients. (3) In addition, the outpatient cost of chronic constipation patients is higher than that of non-chronic constipation patients (15), i.e., to a certain extent, it adds to the financial burden of their patients. Therefore, patients suffering from this disease should be treated in time or adhere to the treatment, which can not only improve the quality of life but also reduce the increase in medical expenses and lower medical costs. The words mentioned above refer to primary constipation and contain different types of constipation; they are different in the treatment measures, but in recent years, most of them have been based on drug therapy, microbiota, and conservative intervention.

This article systematically reviewed the past year's studies on the treatment of chronic constipation in adults and summarized the efficacy and safety of prescription medications, such as linaclotide (10, 16, 17), procalcitonin (16, 18), and lubiprostone (16, 17, 19); microbiota treatments, such as fecal microbiota transplantation (20), prebiotics (8, 21, 22), probiotics (21-24), and synbiotics (21, 22); and conservative interventions, such as dietary fibers (25, 26), and abdominal massages (27), which were designed to comprehensively evaluate the efficacy, safety, and quality of life of patients with chronic constipation, as well as to provide the latest clinical ideas and methods to promote the advancement of treatment technology. This paper aims to comprehensively evaluate the efficacy and safety of these interventions in the treatment of chronic constipation, as well as the symptoms and quality of life of the patients, and also to provide the clinic with the latest therapeutic ideas and methods and to promote the advancement of treatment technology.

2. Methodology

A comprehensive computerized search of the following databases: CNKI, PubMed, Science Direct, and Web of Science was conducted from January 1, 2024 year, to January 1, 2025. The search terms used covered several therapeutic interventions for chronic constipation in adults, organized in the following manner: pharmacotherapy, microbiota, and conservative interventions. Studies that met the following criteria were included in the systematic review:

1) they investigated therapeutic measures regarding chronic constipation in adults, and
2) the study included at least one intervention regarding chronic constipation in adults.

2.1 Screening process

The screening process and data extraction were carried out in four parts:

1) observing whether the abstract and title were consistent with the study of this article;
2) screening for duplicates;
3) deleting studies that did not detect full-text; and
4) excluding full-text articles that were not assessed for eligibility. Data obtained included study design, patient characteristics, sample size, and conclusions.

2.2 Data extraction

Potential papers for inclusion were screened, and potentially relevant studies were searched to determine their eligibility for inclusion. Information extracted included the following categories:

1) publication details, such as first author, year of publication, and country;
2) characteristics of the study participants, including diagnostic criteria and type of constipation, mean age, percentage of females, and sample size;
3) details of the intervention, such as type of intervention, dosage, frequency, and duration; and
4) conclusions of the study.

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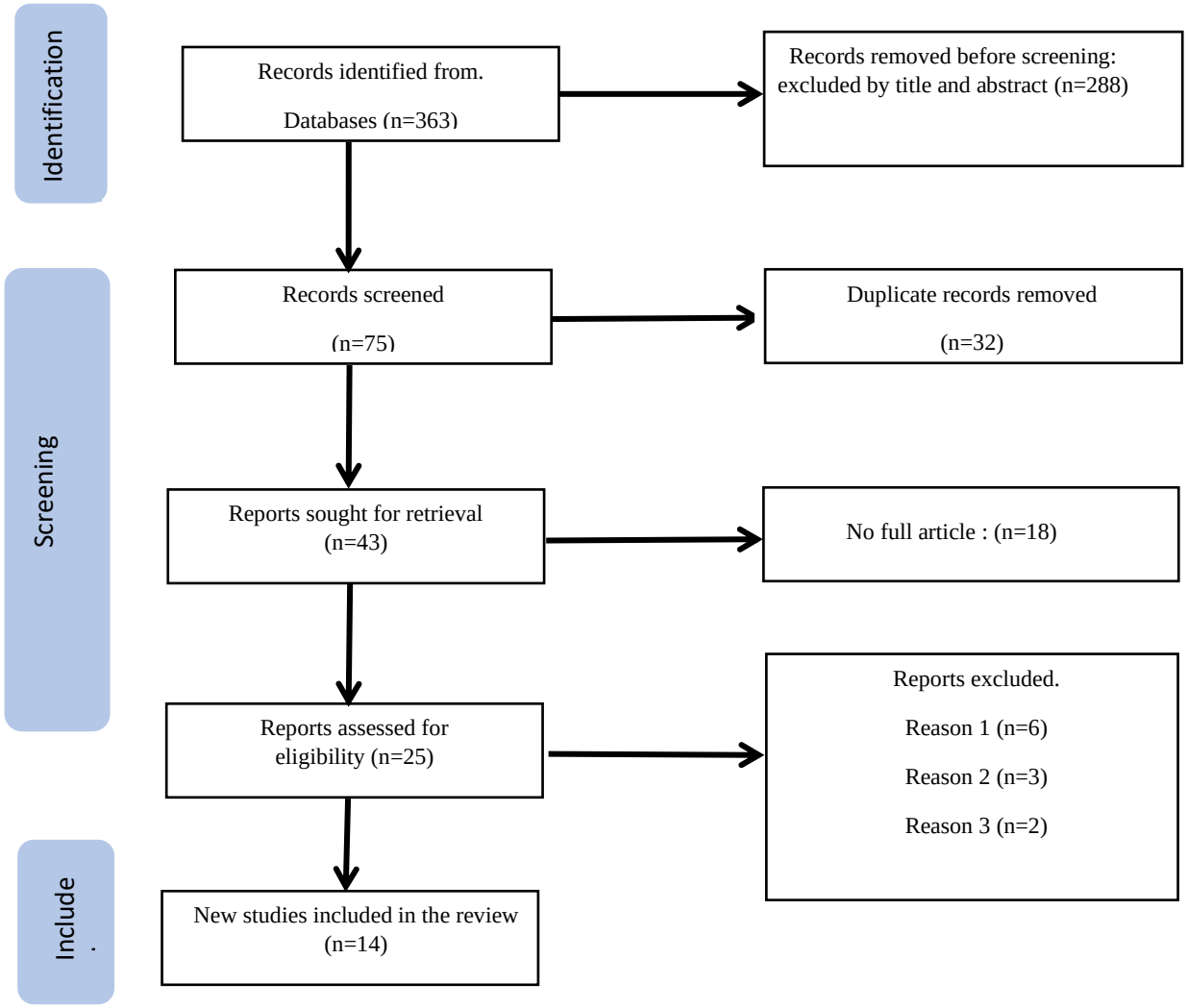

Figure 1: Flowchart of study screening and data extraction

Table 1: Characteristics of included studies

	Study details	Patients' characteristics	Study design	Intervention	Study conclusion
	First author/date /country	**Constipation Diagnosis/type of constipation/mean age (y & SD)/female %**	**Study method/experiment/control sample size/control treatment**	**Intervention method/ intervention dose/ intervention number/ nd intervention duration**	
Medication					
1	Tsutomu Yoshihara / 10 / 2024 / Japan	Rome IV criteria / CC or IBS- C/ 67.6±13.82	Multicenter, open-label, single-arm, exploratory study / 65 / MgO	Rinalodtide / at a daily dose of 500 μ g per day / once daily / for 12 weeks	Rinallode is effective in patients with CC or IBS-C not responsive to magnesium oxide (MgO) treatment.
2	Anthony Lembo, MD, FACG / 2024 / USA	ICD-10-CM: K 59.00, K 59.01, K 59.02, K 59.04, K 59.09 / CIC / 48.0± 14.7 / 87.5%	Observational, retrospective cohort analysis /690, /before drug treatment	Prucapride / 6 months	Many constipation-related symptoms and constipation-related complications were significantly reduced in adults with CIC.
3	E. Coss-Adams / 2024 / Mexico	Rome III criteria / CIC	Phase 3, randomized, double-blind, parallel-group, placebo-controlled / 105 / 106 / placebo	Rubiprost, 24 μ g, twice daily for 4 weeks (28 days)	Rubriprostone is effective and safe in the treatment of CIC in the Mexican population.
4	Brooks D. Cash, MD / 2024 / USA	CIC / 48.3±14.9,81.9%	Retrospective, observational cohort/675/1591,11105,1329/lubiprostone, linaclotide, and prepainted	Plucapride, lubiprostone, linaclotide, and preventive /once a day / for 123.44 days	In patients treated with CIC, prucapride showed higher treatment persistence and compliance than the other three treatments (lubiprostone, linaclotide, and peptide). In patients treated with CIC, prucalopride showed higher treatment persistence and compliance than the other three treatments (lubiprostone, linalopride, and peptide).
5	Satish S. Rao / 2024 / USA	Rome IV criteria / CC	Systematic review and meta-analysis/placebo	Rubiprost:48 μ g twice daily; linaclotide, 145 or 500 micrograms, once daily; logical, 10 mg or 15 mg once daily	All three significantly increased the SBM frequency in week 1 and week 2; after long-term treatment, it can improve the quality of life. In addition, the three drugs have safety

					differences, namely, rubiprost in the treatment of nausea, linalotide in the treatment of diarrhea, and ilobi lower effect in the treatment of abdominal pain.
Microbiota					
6	Neyla Garzon Mora 40 / 2024 / Ecuador	Rome IV criteria / FC	A systematic review and meta-analysis / 1243	Probiotics	The moderate efficacy of probiotics in reducing intestinal transit time indicates the potential of probiotics to treat chronic idiopathic constipation, and studies have also shown that probiotics can treat constipation better than in the placebo group. The moderate efficacy of probiotics in reducing intestinal transit time indicates the potential of probiotics to treat chronic idiopathic constipation, and studies have also shown that probiotics can treat constipation better than in the placebo group.
7	H.K./2024/South Korea	Rome IV criteria / IBS-C / 36.75	A double-blind RCT / 15 / 15 / placebo	Oral RH 3201 or placebo / 110-10 once daily / 8 weeks	Probiotic RH 3201 may contribute to the improvement of IBS-C symptoms by regulating the production of the fecal microbiota and its metabolites.
8	Deng Xinxin / 2024	Rome III criteria / CC	NMA / 3903	Probiotics, prebiotics, and synthetic bacteria	There is moderate to extremely low evidence supporting the use of lactulose and synbiotics to increase the number of defecations per week in patients; special emphasis was placed on the remarkable effect of synbiotics. There is moderate to extremely low evidence supporting the use of lactulose

					and synbiotics to increase the number of defecations per week in patients; special emphasis was placed on the remarkable effect of synbiotics.
9	Ana Terre-n Lora / 2024 / Spain	Rome IV criteria / FC / 45.5±10.9 / 93.2%	Exploratory, randomized, double-blind, placebo-controlled trial / 74 / 74 / maltodextrin	Probiotics, prebiotics, and synthetic bacteria / two bottles a day / once a day / 8 weeks	Weekly stool frequency increased in the four groups, with the most significant change in the synthetic group. Furthermore, stool consistency and quality of life assessment improved in the active treatment group. Furthermore, stool consistency and quality of life assessment improved in the active treatment group.
Conservative interventions					
10	Lee Zhengyuan / 2024 / Korea	Rome IV criteria / IBS-C / 61.9%	Exploratory clinical study / 21	Fecal microbiological transplantation:250 ml per subject receiving a single transplant can be selectively re-transplanted after 6 months \24 weeks.	FMT may be an effective treatment option for improving mild-to-moderate IBS, especially for IBS-C symptoms.
11	Sirirat Luk-In / 2024 / Thailand	Rome IV criterion / CC / 40.9 ± 10.1 and 39.6 ± 9.9; 93.3%	Randomized, double-blind, placebo-controlled study / 49 / 49 / food-grade soy protein	RS-3 / 9 g / once per day / 12 weeks	Taking 9 grams of RS-3 daily for 12 weeks had prebiotic effects that helped to improve intestinal function and caused significant improvements in both the frequency and quality of defecation.
12	Huang Shaoyun / 2025 / Taiwan, China	Rome II, III, and IV criteria / CC / 53%	RCT and quasi-experimental studies / 1866	Abdominal massage / 8-13 minutes / 4 weeks	Abdominal massage can improve the frequency of bowel movement, stool consistency, tension, anorectal obstruction, and other symptoms in patients with CC, and its effect on FC appears to be greater, followed by opioid-induced constipation

					and neurogenic intestinal dysfunction.
13	Suhair A. Abdalla / 2024 / Saudi Arabia	Rome IV criteria / FC / 63y / 44%	Cross-sectional observational study / 77		There was a significant relationship between dietary fiber intake and the prevalence of constipation in HD patients. Mean daily fiber intake was Mean daily fiber intake was significantly lower in constipated patients than in non-constipated patients. In addition, international guidelines recommend that MHD patients In addition, international guidelines recommend that MHD patients consume 20-30 grams of dietary fiber per day, which can effectively prevent constipation.
14	Alice Van Der Schoot / 2024 / UK		Systematic review and meta-analysis / 1714 / low mineral water, white bread, low-fiber diet, etc.	Kiwi, 2-3 daily/high mineral water daily 0.5-1.0L / rye bread 6 or 8 tablets daily, 3 weeks / high-fiber diet 25-30 g daily, 9 weeks / fiber-free diet, reduce dietary fiber intake daily, 6 months: supplemented water, 2 liters daily; 2 months: west 54 g per day for 8 weeks	Fruit and rye bread can improve some constipation-related outcomes. In particular, kiwifruit was found to significantly increase stool frequency and is higher compared to psyllium.

Note: CC: chronic constipation; CIC: chronic idiopathic constipation; FC: functional constipation; IBS-C: constipated bowel stress syndrome; RH3201: Lacticaseibacillus rhamnosus IDCC; FMT: fecal microbiota transplantation; IBS: intestinal stress syndrome; RS-3: resistant starch type 3

In recent years, the treatment of chronic constipation is not limited to laxatives, but some prescription drugs have been used to treat and improve constipation, and this paper includes five studies on prescription drugs for chronic constipation (10, 16-19), which include three: the serum laxative Procalcitonin, the pro-secretory agent Rubiprostenone, and Linaclotide. By reviewing the studies of these three on chronic constipation, it is concluded whether they have favorable efficacy and what recent advances have been made in this regard.

In this paper, a total of three studies (10, 16, 17) reported the efficacy, safety, patient characteristics, and quality of life of linaclotide in chronic constipation. In the first prospective study(10), linaclotide significantly improved patients' quality of life scores with an increase in the mean weekly SBM frequency and CSBM frequency after 12 weeks compared to the control group, with a mean change of 2.70±7.254 ($p<0.01$) and 2.81±5.254 ($p<0.001$). In the second retrospective observational study(16), one prescription drug was used to compare with three other prescription drugs, and the results showed that linaclotide was not as effective as prucalopride, and in addition, discontinuation of linaclotide was more common in patients with CIC. In a third meta-analysis(17), linaclotide was found to significantly improve the frequency of SBM at weeks 1 and 2 compared to the placebo group with the other two prescription medications, and both altered the quality of life of the patients after long-term treatment, although linaclotide was less effective in the treatment of diarrhea. All of the above studies have also shown that linaclotide has a favorable safety profile for chronic constipation. In conclusion, the use of linaclotide improves the efficacy, patient characteristics, and quality of life in chronic constipation but is less effective in the treatment of diarrhea.

In this review, a total of 2 studies (16, 18), reported the efficacy of prucalopride in chronic constipation and patient characteristics. In the first observational retrospective study(18), many constipation-related symptoms (e.g., abdominal pain [50.4% vs. 33.3%, $P < 0.001$], bloating [23.9% vs. 13.3%, $P < 0.001$], and nausea [22.6% vs. 17.7%, $P < 0.01$]) and constipation complications (e.g., bowel obstruction [4.9% vs. 2.0%, $P < 0.001$], hemorrhoids [10.7% vs. 7.0%, $P < 0.05$], and rectal bleeding [4.1% vs. 1.7%, $P < 0.05$]) were significantly reduced, but no improvement in bowel insufficiency was seen. In a second retrospective observational study(16), procalcitonin was associated with greater treatment durability and adherence in the treatment of CIC compared with the other three prescription medications. In conclusion, the use of prucalopride may well improve patient characteristics and have better treatment durability and adherence in the treatment of patients with CIC.

In addition, a total of three studies (16, 17, 19), reported the efficacy, safety, patient characteristics, and quality of life of the use of rubriprostone in chronic constipation. In the first randomized controlled trial(19), patients using 24μg of oral rubiprostone (twice daily) had a significant increase in the frequency of spontaneous bowel movements (SBM) during the first week of treatment compared to placebo, and the proportion of SBM frequency/week was significantly higher in the rubiprostone group than in the placebo group at weeks 2, 3, and 4. In addition, within 24 hours of the first dose, 60.0% of patients in the rubraca group experienced SBM compared to 41.5% in the placebo group,

with a p-value of 0.009, suggesting better efficacy within 24 hours in the rubiprostone group. In addition, the rubiprostenone treatment group showed significant improvement in bowel pressure, stool consistency, bloating, and satisfaction.

In the second retrospective observational study (16), lubiprostone showed weaker treatment durability and adherence in the treatment of patients with CIC compared to prucalopride. In the third meta-analysis study (17), compared with placebo, lubiprostone significantly increased the frequency of SBM at weeks 1 and 2 and improved patients' quality of life after long-term treatment, but lubiprostone was less effective in treating nausea. In conclusion, the use of lubiprostone showed favorable status in terms of efficacy, patient characteristics, and quality of life in chronic constipation, in addition to being weaker than procalcitonin in terms of safety, as well as being less effective in the treatment of nausea.

In addition to prescription drug therapies, there has been an increasing number of studies on microbial therapy in recent years, and four studies on microbial therapy were included in this paper (8, 20-24). A total of 1 study (20) reported fecal microbiota transplantation (FMT); in this exploratory study at week 4, 19 subjects had a reduction in IBS-symptom severity scores after FMT, and remission was achieved in 71.4% (5/7) of the IBS-C group and 20.0% (2/10) of the IBS-D (diarrheal irritable bowel syndrome) group at week 12, and remission status was maintained until week 24. Overall, FMT may be an effective therapeutic option to improve the symptoms of mild to moderate IBS, especially IBS-C.

In addition, a total of four studies (21-24), reported the efficacy, safety, patient characteristics, and quality of life of the use of probiotics for chronic constipation. In the first meta-analysis study (23), subgroup analysis revealed 95% heterogeneity with statistical significance analysis (p-value <0.05), i.e., it demonstrated the superiority of probiotics over placebo in the treatment of constipation and also emphasized the statistically significant efficacy of probiotics in patients with constipation and supported the reinforcement of this body of evidence through larger randomized controlled trials (RCTs) The Need. In a second randomized controlled trial (24), patients taking RH 3201 showed a significant improvement in the frequency of irritable bowel movements and constipation-induced discomfort after 8 weeks, and a significant improvement in post-bowel movement discomfort at 4 weeks, compared to placebo. In addition, the total IBS-SSS score showed significant improvement in IBS-C symptoms at 8 weeks with bloating severity, unsatisfactory bowel habits, and interference with daily activities significantly improving at either 4 or 8 weeks. In addition, the total IBS-QOL score (quality of life) improved.

In the third network meta-analysis(21), probiotics were statistically less significant for weekly stool frequency compared to prebiotics and synbiotics, and Lactobacillus paracasei was associated with the highest probability of being effective in reducing the severity of incomplete evacuation; the therapeutic effect of a probiotic (Lactobacillus Royale) was significant. In the fourth randomized controlled trial (22), the probiotic, prebiotic, and synthetic groups were significantly more effective in the treatment of chronic constipation compared with placebo; the prebiotic group (1.72 ± 0.58 vs. 2.56 ±

1.15, P < 0.001) was more effective than the probiotic and synthetic groups in improving stool consistency. In conclusion, probiotics were more effective in terms of efficacy, safety, patient characteristics, and quality of life in chronic constipation and were more significant in the treatment of constipation as compared to placebo but less effective when compared to the other two microbiota, i.e., stool frequency, stool consistency, and physical health domains.

In addition, a total of three studies (8, 21, 22), reported the efficacy, safety, patient characteristics, and quality of life of using prebiotics in chronic constipation. In the first network meta-analysis(21), lactulose (mean difference [MD] = 3.39, 95% confidence interval [CI] [1.13, 5.65], moderate certainty) and partially synthesized bacteria had a significant effect in increasing the frequency of weekly bowel movements in adult patients with chronic constipation compared with placebo. In the second randomized controlled trial(22), compared with the probiotic group (1.90 ± 1.21 vs. 2.95 ± 1.23; P < 0.008) and the synthetic bacteria group (2.03 ± 0.75 vs. 2.88 ± 0.93; P < 0.004), the improvement in fecal consistency in the probiotic group (1.72 ± 0.58 vs. 2.56 ± 1.15, P < 0.001) The effect was better; in addition, the probiotic group was better in terms of improvement in abdominal pain (8.28±2.63 vs. 6.56±2.62, P=0.009), but to a lesser extent compared to the synthetic bacteria group. In the third randomized controlled trial (8) on the improvement of constipation by prebiotics by looking at the improvement effect of type 3 resistant starch on constipation, the results showed a significant increase in the level of beneficial intestinal bacteria and relief of constipation with the intake of RS-3 and a significant increase in the frequency of bowel movements in the RS-3 group compared to the placebo group. In conclusion, prebiotics are more effective in improving health areas, fecal consistency, abdominal pain, and increasing the frequency of bowel movements.

In addition, a total of 2 studies (21, 22) reported the efficacy, safety, patient characteristics, and quality of life of using probiotics with synbiotics for chronic constipation. In the first network meta-analysis(21), findings showed that synbiotics demonstrated a significant effect in increasing the number of bowel movements per week, with a MIX 7 (probability of 94.8%) being the most likely to be the most effective intervention, and that synbiotics also demonstrated a significant advantage in improving patients' constipation assessment scores compared with Lactobacillus plantarum. In the second randomized controlled trial (22), which compared the therapeutic effect of dietary supplements on the symptoms of FC patients by creating four treatment groups, the results showed that patients in the synbiotic group had a significant increase in weekly bowel frequency (2.8±1.3 vs. 5.9±2.6, P<0.001) after 8 weeks of treatment. In addition, the synthetic bacteria group showed the greatest improvement in stool consistency according to the Bristol Stool Scale score (2.03±0.75 vs. 2.88±0.93; P<0.004). In the assessment of gastrointestinal symptoms, the synthetic bacteria group also showed significant improvements in abdominal pain, gastroesophageal reflux, and constipation symptoms (13.00±3.97 vs. 8.71±3.35; P<0.003). In conclusion, the impact of synbiotics on the efficacy, safety, patient characteristics, and quality of life of chronic constipation was more significant compared to the two microbial treatments, probiotics and prebiotics.

In addition, this paper included studies of conservative interventions in addition to those of prescription drug therapy versus microbial therapy, but this paper reviewed two main types of interventions, dietary fiber and abdominal massage. A total of 1 study reported the efficacy, safety, patient characteristics, and quality of life of using abdominal massage for chronic constipation. In a systematic review and meta-analysis study (27), the efficacy of abdominal massage on chronic constipation was investigated by comparatively analyzing the efficacy of abdominal massage on chronic techniques of different etiologies and different types of abdominal massage techniques in terms of efficacy, stool consistency, and frequency of bowel movements. The results of this study showed that abdominal massage significantly increased the number of bowel movements per week compared to the control group (MD = 1.59; 95% CI 1.06, 2.11; df = 10; I2 = 82%), and the intestinal transit time was shortened (MD = -21.53h; 95% CI -35.94, -7.12; df = 3; I2 = 65%), and reduced constipation symptoms (SMD =-1.06; 95% CI -1.33, -0.80; df = 18; I2 = 79%), but did not reduce laxative use (OR= 0.43, 95% CI 0.14, 1.34, p = 0.15; I2 = 74%). In the subgroup analyses presented here, abdominal massage (SMD of 1.23) was found to have the greatest effect on functional constipation compared with controls, whereas the SMDs for neurogenic bowel dysfunction and opioid-induced constipation were 0.68 and 1.06, respectively. Additionally, compared with circular massage (SMD = 0.90; 95%CI = 0.57, 1.22; df = 10; I2 = 68%) or electric device massage, acupressure and aromatherapy massage had a greater effect on bowel frequency (SMD = 1.63; 95% ci 1.06, 2.21; df = 3; I2 = 86%). In conclusion, abdominal massage is effective in chronic constipation, increasing bowel frequency and improving constipation-related symptoms, and in terms of massage type, acupressure and aromatherapy massage also increase bowel frequency in chronic constipation.

In addition, a total of 2 studies (25, 26) in this paper reported the efficacy, safety, patient characteristics, and quality of life of using dietary fiber in chronic constipation. In the first cross-sectional study (25), the aim was to investigate the relationship between dietary fiber intake and the prevalence of constipation among HD patients by studying hemodialysis (HD) patients with end-stage renal disease (ESRD); however, the results also showed that there was a significant relationship between fiber intake and constipation ($p < 0.05$) and that constipated patients had lower fiber intake than non-constipated patients ($p = 0.001$); therefore, international guidelines recommend that hemodialysis patients with end-stage renal disease should consume 20-30 g of dietary fiber per day to effectively prevent constipation.

In the second systematic review and meta-analysis (26), the effects of a number of dietary fiber foods on chronic constipation were synthesized, with the more significant effects being on fruit and rye bread. Compared to psyllium, fruit had a higher effect on stool frequency (MD: +0.36 BM/week, 95% CI: 0.25-0.48, $p < 0.00001$; I2 = 0%, p = 0.78) and stool consistency (MD: +0.48 points, 95% CI: 0.11-0.86, p = 0.01). The effects of stool frequency, stool consistency, and stool weight were more pronounced with the consumption of rye bread compared to white bread, and rye bread had a lesser effect on blood glucose during the digestive process than white bread; however, the current study has different findings about the degree of difficulty in defecation, and therefore it is not

possible to report the effect of rye bread on gastrointestinal symptoms with greater precision. In conclusion, dietary fiber has good efficacy in chronic constipation, as well as in constipation caused by some diseases, and no adverse events occurred in the studies, fruit and rye bread have good effects on stool frequency.

3. Discussion

The treatment of chronic constipation (CC), a common gastrointestinal disorder, is no longer limited to traditional laxatives but also includes a variety of new therapeutic measures, such as pharmacotherapy, microbiota therapy, and conservative interventions. These therapeutic measures aim to improve patient's quality of life and reduce healthcare. In terms of pharmacologic treatment, drugs such as linaclotide, procalcitonin, and lubriprostone have been studied. Linaclotide showed significant results in improving patients' quality of life, weekly spontaneous bowel movement (SBM) frequency, and chronic idiopathic constipation (CIC) symptoms, but was less effective in treating diarrhea. Prucalopride showed good treatment durability and compliance in the treatment of patients with CIC. Rubriprostenone also showed good efficacy and safety in the treatment of chronic constipation, but it was less effective in the treatment of nausea. Microbiota treatments include fecal microbiota transplantation (FMT), probiotics, prebiotics, and synbiotics. FMT has shown potential efficacy in improving the symptoms of mild to moderate irritable bowel syndrome (IBS). Probiotics are effective in the treatment of chronic constipation, with a statistically significant effect of probiotics in the treatment of constipation when compared to placebo. In addition, Schot et al. and Zhang et al. reported a significant increase in the frequency of bowel movements with the use of probiotic preparations, with a special emphasis on Lactobacillus bacteria that increased the number of bowel movements by 0.96 times per week (28, 29). Meanwhile, it has been shown that Lactobacillus Royale, as a potent probiotic, is recommended as the best intervention to promote a better quality of life in CC patients(21). Probiotics and synbiotics have also shown positive results in increasing bowel frequency and improving stool consistency.

Regarding conservative interventions, dietary fiber, and abdominal massage are the two main types of intervention. Dietary fiber has good efficacy in chronic constipation; especially fruits and rye bread are effective in increasing bowel frequency. e.g., eating 2-3 kiwifruit per day may be considered a well-tolerated therapeutic measure that may improve bowel frequency (26), as kiwifruit is rich in both soluble and insoluble fibers, which may increase fecal water content and colonic volume (MRI) (30-33). Kiwifruit may also have butyric acid, bifidus, and anti-inflammatory effects observed in a human gastrointestinal model of constipation(34). Abdominal massage can significantly increase the number of bowel movements and improve symptoms associated with constipation.

3.1 Advantages of Taijiquan in treating and improving chronic constipation

In improving chronic constipation in adults, in addition to medication, microbial therapy, and conservative interventions, some low- and medium-intensity exercises can also be performed, which can greatly reduce medical costs and play a good preventive and ameliorative role, as well as have good efficacy in the prevention of other diseases. Taijiquan, as an excellent traditional Chinese culture, has movements that are both rigid and flexible and can regulate the circulation of blood and qi and the metabolism of the body (35). Taijiquan mainly uses abdominal breathing, which promotes the secretion of digestive juices and improves digestion, and one of the symptoms of chronic constipation is bloating. Therefore, practicing Tai chi can reduce bloating and further improve constipation.

In addition, this article mentions that probiotics can effectively improve the symptoms of chronic constipation, and some studies have shown that constipated patients with 12 weeks of taijiquan training have significantly higher numbers of beneficial flora in the intestinal tract, with more pronounced changes in the number of bifidobacteria and a significant decrease in the number of harmful flora(36). Bifidobacteria and other probiotics have the function of regulating intestinal flora, improving intestinal permeability, regulating immune-inflammatory response, and lowering the level of serum inflammatory factors and endotoxin, etc. Practicing taijiquan can increase the number and types of probiotics in the patient's body to a certain extent. (37)

In addition, patients with chronic constipation usually have intestinal microecological imbalance, and this imbalance may lead to changes in the patient's intestinal internal environment, which in turn may lead to chronic inflammation, and the practice of Tai chi may reduce inflammatory responses and promote intestinal health. Some studies have shown that Tai Chi training may reduce inflammation by decreasing the abundance of bacteria associated with pro-inflammatory conditions, such as Aspergillus(38).

Therefore, practicing Tai Chi can prevent and improve chronic constipation through abdominal breathing, production of beneficial flora, and reduction of inflammatory response. However, there are fewer studies related to whether practicing Tai Chi can produce short-chain fatty acids to promote intestinal health and whether it can improve the overall function of the digestive system by improving the function of the brain-gut axis, and thus improve the symptoms of patients with chronic constipation, so that subsequent studies may expand the research in this area to provide more interventions for the prevention and improvement of chronic constipation, to provide the clinic with the latest therapeutic ideas and methods, and to promote the advancement of therapeutic technology.

4. Conclusion

Chronic constipation is treated with a variety of therapeutic measures, including medication, microbiota therapy, and conservative interventions. These therapeutic

measures have shown positive results in improving patients' quality of life, increasing the frequency of bowel movements, and improving constipation symptoms. In addition, Tai Chi, a low- to moderate-intensity exercise, has been proposed to improve chronic constipation by preventing and improving chronic constipation through abdominal breathing, production of beneficial flora, and reduction of inflammatory response. However, there are variations in the effectiveness and applicability of different treatments, and appropriate treatment options need to be selected based on the patient's specific condition.

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