The irritable bowel syndrome (IBS) is a common disorder, with a prevalence of 14% to 24% in women and 5% to 19% in men. Although most individuals meeting diagnostic criteria for IBS will not seek care, it accounts for 12% of visits to primary care physicians and 28% of visits to gastroenterologists. In addition, IBS is associated with significant impairment in quality of life, high rates of absenteeism, and significantly increased health care costs.

Effective therapies are lacking. More than a decade ago, Klein commented that “not a single study has been published that provides compelling evidence that any therapeutic agent is efficacious in the global treatment of IBS.” Little has changed. Attempts to introduce agents acting via serotoninergic receptors have met with concerns about safety and efficacy. In addition, managed-care pressures have limited the time physicians can spend with patients. This is highly detrimental, as the physician-patient relationship is a critical determinant of treatment success.

The lack of efficacious therapies and diminution of the physician-patient relationship have been accompanied by increased use of complementary and alternative therapies. Between 11% and 43% of patients with gastrointestinal disorders use alternative or complementary techniques, and many consider them beneficial. Unfortunately, physicians are generally not well acquainted with these therapies, and there is a scarcity of reasonable data with which to become acquainted. This article reviews the available literature for alternative or complementary treatments of IBS.

METHODS

DATA SOURCES

All published English-language studies were identified by a comprehensive search of the MEDLINE database from 1966 through 2001. Bibliographies of index references meeting inclusion criteria were searched for additional references.

INCLUSION AND EXCLUSION CRITERIA

Study selection criteria were defined a priori. Candidate studies included clinical trials performed in adults with IBS. Evaluable therapies included acidophilus, acupuncture, allergy, aloe, alternative medicine, bacterial overgrowth, bio-

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feedback hypnotherapy, chemical sensitivity, Chinese medicine, colonic irrigation, diet, Lactobacillus, peppermint oil, and probiotics. Unevaluable therapies included aromatherapy, Candida, enemas, ginger, herbs, massage, meditation, reflexology, supplements, and vitamins.

Only studies published in full were evaluated. Abstracts, letters, incomplete reports in book chapters, and reviews were excluded. Nonrandomized or uncontrolled studies were excluded.

DATA EXTRACTION

Trial outcomes and methods were evaluated independently by 2 investigators (J.A.S. and M.P.J.). A third investigator (C.W.H.) resolved discrepancies. Symptom improvement was defined as a 50% or greater decrease in total symptom scores. In studies using different symptom-reporting scales, the relative percentage change in global symptoms was determined. All studies were analyzed by means of an intention-to-treat analysis. Methodologic quality of each trial was assessed by means of the following standard scoring system to measure the likelihood of bias14:

Give 1 point for each “yes” and 0 point for each “no”:

- Was the study described as randomized?
- Was the study described as double-blind?
- Was there a description of withdrawals and dropouts?
- Was the method to generate the sequence of randomization described and was it appropriate?
- Was the method of double-blinding described and was it appropriate?

Deduct 1 point if:

- The method to generate the sequence of randomization was described and it was inappropriate
- The method of double-blinding was described and it was inappropriate

DATA ANALYSIS

Statistical combination of trial results was performed with RevMan 4.1 meta-analysis software issued by the Cochrane Collaboration, Oxford, England. The measure of association was the odds ratio, which, along with 95% confidence intervals and tests for heterogeneity, was calculated by means of a fixed-effects model. Differences between treatment and placebo groups and differences between placebo groups were assessed by $\chi^2$ analysis.

RESULTS

HERBAL REMEDIES

Patients commonly use dietary supplements and herbal remedies, yet few supporting data exist. Only one randomized, double-blind, placebo-controlled trial of traditional Chinese medicine has been published in English.15 In this study, 106 patients with IBS by Rome criteria were randomized to individualized herbal preparations, standardized herbal preparations, or placebo. After 16 weeks, digestive symptoms were significantly improved over those with placebo treatment in both treatment groups. Individualized preparations were no different from the standardized formulation at 16 weeks, but did show greater sustained improvement after an additional 14 weeks of follow-up.

An Ayurvedic preparation containing Aegle marmelos correa and Bacopa monnieri was compared with standard medical therapy or placebo in a 6-week, double-blind, randomized, controlled trial.16 The rate of improvement was 65% for Ayurvedic therapy, 78% for standard therapy, and 33% for placebo. Ayurvedic therapy was noted to be particularly helpful in patients with diarrhea. Relapse rates at 6 months were similar in all groups.

COMMERCially AVAILABLE SUPPLEMENTS AND PREPARATIONS

A variety of commercial products are marketed to treat IBS. The most widely used agents are peppermint oil, ginger, and aloe. In addition, a number of plant extracts are used to treat constipation, and these were recently reviewed elsewhere.17

Ginger

No studies have specifically evaluated ginger in the management of IBS. Ginger has been used to treat nausea. Several methodologically sound studies have assessed the efficacy of ginger in the treatment of postoperative nausea and vomiting.18-21 Pooled analyses of these data are shown in Figure 1. No difference exists between ginger and placebo in preventing postoperative nausea and vomiting. A similar conclusion was reached by Ernst and Pittler22 in a recent systematic review of the subject. Two additional controlled studies have shown benefit for ginger in preventing seasickness and reducing symptoms in hyperemesis gravidarum.23,24

Aloe

Aloe is commonly used in IBS, particularly the constipation-predominant subtype. Although aloe is commonly considered a safe, “natural” remedy, the active ingredients are anthraquinones. No data presently exist regarding the use of aloe in IBS. Odes and Madar25 showed that a preparation containing celandin, alo vera, and psyllium resulted in greater symptom reduction than placebo in a group of 35 patients with chronic constipation. The preparation was not helpful in reducing abdominal pain scores.

Peppermint Oil

Peppermint oil has antispasmodic properties. The principal active ingredient of peppermint oil is menthol, which is a cyclic monoterpen that relaxes smooth muscle by blocking calcium influx.26 Because of this, peppermint oil is frequently used to

Figure 1. Ginger capsules vs placebo in the control of postoperative nausea and vomiting. OR indicates odds ratio; CI, confidence interval.
treat IBS as well as dyspepsia. Although a number of studies have been performed, efficacy remains unclear.

Seven randomized controlled trials were identified and 2 were excluded. One study was performed in a predominantly male population of Taiwanese veterans with IBS.27 Peppermint oil was superior to placebo in improving symptoms after 1 month of therapy. The study was excluded, as the population was not representative of the patient population seen by most clinicians. A second study was excluded because it was performed in children.28 This study also found peppermint oil superior to placebo after 2 weeks of therapy.

The remaining 5 trials are summarized in Table 1. Four of the 5 trials were sufficiently comparable in method to attempt meta-analysis.29-32 The result of this analysis modestly favored peppermint oil over placebo (odds ratio, 2.70; 95% confidence interval, 1.56-4.76). This is consistent with a similar analysis performed by Pittler and Ernst.33 However, our analysis showed significant heterogeneity, which limits interpretability (χ²=20.81; P<.001). Pittler and Ernst did not assess heterogeneity, as they used a random-effects rather than fixed-effects model. In addition, the duration of treatment in all studies never exceeded 3 weeks.

The study by Lawson et al34 was not included in the meta-analysis because of methodologic differences. This trial of 25 subjects studied for 4 weeks did not find peppermint oil superior to placebo.

ALTERATION OF INTESTINAL MICROFLORA

Our understanding of the complex relationship between host and enteric microflora is evolving but crude. Recent investigations have highlighted the development of IBS after bacterial gastroenteritis.36-38 Mechanistic observations in this area are scant and disparate. Postenteric IBS has been suggested to be due to persistent alterations in gut neuroendocrine function and permeability39 as well as psychosocial predisposition toward symptom embracement.40-41

Bacterial Overgrowth

Flatulence, bloating, and altered stool consistency can be seen in both IBS and bacterial overgrowth, and a recent uncontrolled, retrospective analysis reported that much of IBS was attributable to small-intestinal bacterial overgrowth.42 This study has been widely embraced by the lay press and widely criticized by the scientific community.43-46 Prospective controlled investigations are needed in this area before conclusions can be drawn.

Probiotics

Although unproven, probiotics are commonly used in the form of yogurt or acidophilus cultures. The probiotic Lactobacillus plantarum was administered in a randomized, placebo-controlled, double-blind fashion for 4 weeks to patients meeting Rome criteria for IBS.37 Treated patients had significant reductions in flatulence and abdominal pain and improved defecatory satisfaction at 6 and 52 weeks. However, a second randomized, double-blind, placebo-controlled trial of 19 patients with Rome criteria–defined IBS failed to show benefit after treatment with Lactobacillus GG.40 A trend toward improvement was noted, however, for a reduction in the number of unformed bowel motions in treated patients with diarrhea. Oligofructose and inulin are probiotic agents reported to increase bifidobacteria in feces and increase stool weight, which makes them attractive in the management of constipation.48 A randomized, controlled, double-blind crossover study of the probiotic oligofructose in 21 patients with IBS, however, failed to detect any effects on symptoms, whole-gut transit time, fecal weight, or pH.49

DIETARY MODIFICATION, FOOD ALLERGY, AND INTOLERANCE

Exclusion Diets

Dietary modification is a cornerstone of IBS management. Adverse reactions to food are common, particularly in diarrhea-predominant forms. Positive responses to elimination diets range from 15% to 71%, with double-blind, placebo-controlled challenges identifying problem foods in 6% to 58% of cases.51,52 Milk, wheat, and eggs are most frequently identified.

The generic implementation of exclusion diets was evaluated by King et al53 in a crossover controlled trial of healthy control subjects and patients with IBS meeting Rome criteria. Compared with controls, patients with IBS produced similar total volumes of colonic gas but significantly more hydrogen. An exclusion diet eliminating beef, wheat, and dairy products significantly reduced total and hydrogen gas production by both groups and abolished differences between IBS and control subjects with respect to

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Table 1. Double-blind, Placebo-Controlled, Crossover Trials of Peppermint Oil in Irritable Bowel Syndrome

<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnostic Criteria</th>
<th>No. of Patients Entered</th>
<th>No. of Dropouts</th>
<th>Treatment Period, wk</th>
<th>Jadad Score (0-5)</th>
<th>Improvement, No. (Peppermint vs Placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rees et al, 1979</td>
<td>NR</td>
<td>18</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>13/16 vs 2/16</td>
</tr>
<tr>
<td>Dew et al, 1984</td>
<td>NR</td>
<td>29</td>
<td>NR</td>
<td>2</td>
<td>3</td>
<td>24/29 vs 5/29</td>
</tr>
<tr>
<td>Nash et al, 1986</td>
<td>NR</td>
<td>41</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>13/33 vs 17/33</td>
</tr>
<tr>
<td>Carling et al, 1989</td>
<td>NR</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>17/30 vs 5/13</td>
</tr>
<tr>
<td>Lawson et al, 1988</td>
<td>Manning‡</td>
<td>25</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>Only difference was increased stool frequency with peppermint oil</td>
</tr>
</tbody>
</table>

Abbreviation: NR, not reported.
*Explained in Jadad et al.14
†Explained in Talley et al.34
concluded that bulking agents ap-
the efficacy of bulking agents was not
such as stool frequency, pain, and
efit was seen for specific symptoms
in nonspecific outcomes. Less ben-
Most studies reported improvement
methodologically of high quality.
4 positive trials were considered
als, 4 demonstrated efficacy and 3 of

DIGESTIVE SUPPLEMENTS

Bulking Agents

Dietary supplements are commonly
used to treat IBS, and the most widely
prescribed of these are bulking agents.
Bulking agents were recently reviewed
by Jailwala and colleagues. Of 13 tri-
als, 4 demonstrated efficacy and 3 of
positive trials were considered
methodologically of high quality.
Most studies reported improvement
in nonspecific outcomes. Less ben-
was seen for specific symptoms
such as stool frequency, pain, and
bloating. The authors concluded that
the efficacy of bulking agents was not
clearly established. A similar review
concluded that bulking agents ap-
to have efficacy in the treat-
ment of constipation, but little effi-
cy for the entire IBS symptom complex.

Pancreatic Enzymes

Many patients with IBS use diges-
tive enzyme supplements such as pa-
paya extract, lactase, ox bile ex-
tact, and pancreatic enzymes or
pancreatic extracts. The utility of any
of these is unproven. A single trial
of pancreatic enzymes given with a
large fatty meal reported significant
reductions in postprandial bloating in healthy subjects. Unfortunately, the assessment period
was just the day of the test meal and
subjects were at most mildly symp-
tomatic, with mean scores for bloat-
ing of 0.2 and 0.6 cm on a 6-cm vi-
us analog scale. Bloating was the
only symptom that improved; no sig-
nificant changes were seen for gas,
pain, nausea, or fullness.

Lactose and Fructose Intolerance

Carbohydrate intolerance receives a
great deal of attention in IBS. Lac-
tase nonpersistence is common in
much of the world, but its preva-
ence varies across populations. For
example, a study of Italian patients
with unexplained abdominal pain and
intermittent diarrhea reported lactose intolerance in 74% com-
pared with a population preva-
ence of 34%. A study in non-
Jewish whites of northern-western
European ancestry found lactase de-
cency in only 6% of both subjects
with IBS and healthy control sub-
jects. A study of British subjects
found lactase deficiency in 4.7% of
asymptomatic whites and 75% of
asymptomatic nonwhites. Lact-
tase deficiency was identified in 16
(8%) of 200 patients with IBS and
was not different from baseline
population prevalence. Vesa and col-
leagues identified 101 lactose
maldigesters among 427 healthy
subjects. Subjects were further char-
acterized as meeting Rome criteria
for IBS. Diagnostic symptoms for IBS
were present in 15% of both lactose
digesters and maldigesters. Among
subjects who considered them-
selves dairy intolerant, equal pro-
portions were lactose digesters and
maldigesters.

Fructose malabsorption has also
been evaluated in IBS. Fructose mal-
absorption (identified by breath test-
ing) was reported in 13 of 25 Danish
patients with IBS, with subjects being
both clinically and biochemically
positive. There was no control
group. Fructose-sorbitol malabsorp-
tion was seen in 30% of patients with
IBS and 40% of control subjects.
Thirty-one (44%) of the patients with
IBS developed symptoms during test-
ing, compared with 3 (4%) of 85 con-
trols. Symptomatic and asympto-
matic subjects did not differ with
regard to the presence or absence of
fructose-sorbitol malabsorption. A
prospective evaluation compared lac-
tose, fructose, sorbitol, and sucrose
absorption in 25 consecutive outpa-
tients with IBS and 12 healthy con-
trol subjects. Malabsorption of at
least 1 test sugar was present in more
than 90% of all subjects. Although
rates of carbohydrate malabsorption
were similar, patients with IBS re-
ported more symptoms after sugar in-
gestion than control subjects did.
These data suggest that carbohy-
rate malabsorption may not be more
prevalent in those with IBS or self-
reported dairy intolerance, but these
patients develop a greater degree of
symptoms or are more bothered by
their symptoms.

Four open, uncontrolled studi-
es have evaluated response to a
lactose-restricted diet. Fernandez-
Banares et al reported that 40% of
patients with IBS with intolerance to
lactose, fructose, sorbitol, or suc-
rose clinically improved after in-
take of the offending sugar was re-
stricted. A similar study in Israeli
patients with IBS symptoms identi-
fied lactose malabsorption in 82%,
fructose malabsorption in 43%, and
fructose-sorbitol malabsorption in
70%. Symptom assessment after 1-
month treatment with a diet de-
void of the offending sugar demon-
strated significant improvement in
56% of subjects. Vernia and col-
leagues studied 230 consecutive
patients with IBS with no history of
milk intolerance. Typical of a Medi-
terranean population, lactose intol-
erance was diagnosed by breath test-
ing in 157 (68%) of 230 patients. Of
the 110 patients who complied with
the diet, symptoms “subsided” in
44%, were “reduced” in 39%, and

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were unchanged in 15%. Partial symptom improvement was reported in 20% of subjects who either were noncompliant with the diet or were lactose absorbers. There was no relationship between pre-trial symptoms and dietary response, although the authors noted that the occurrence of symptoms during the breath test was predictive of a response to diet. In an uncontrolled prospective evaluation during a 5-year period, 14 of 16 lactose-intolerant patients with IBS reported marked improvement in symptoms. This was also associated with a 75% reduction in clinic visits. Only one study has evaluated the use of supplemental lactase in a double-blind, placebo-controlled trial. Twelve subjects were treated with lactase or placebo in a crossover trial. Eight of 12 subjects were lactase nonpersistent, ie, they had lost documented activity of the enzyme lactase. Lactase supplementation was not associated with symptom improvement regardless of lactase status.

PSYCHOLOGICAL THERAPIES

Psychological therapies can be broadly classified as psychotherapy, behavior therapy, hypnotherapy, and multicomponent therapy. For purposes of analysis, each category is reviewed separately.

Hypnotherapy

Three of 6 articles were excluded because they were uncontrolled. All 3 studies noted improvement with “gut-directed hypnotherapy” and reported response rates of 55%, 84%, and 93%.

Included studies also demonstrated benefits. Prior and colleagues reported improved tolerance to rectal balloon distention in diarrhea-predominant but not constipation-predominant IBS. No changes in rectal sensation were seen in a control group of 15 patients with IBS who did not receive hypnotherapy. Thirteen of 15 hypnotherapy-treated patients considered themselves improved. Whorwell et al, in their initial published trial of gut-directed hypnotherapy, reported hypnotherapy superior to placebo. Thirty subjects were randomized after a 2-week washout period. As placebo, a physician without specific training provided counseling focused on discussion of symptoms and exploration of emotional and stress factors contributing to symptoms. After a 3-month treatment period that included 7 therapy sessions, both groups showed significant improvement in scores for abdominal pain, distention, and well-being. No significant improvement was seen in the control group for bowel habit. Hypnotherapy was superior to control treatment in all measures. Galovski and Blanchard compared hypnotherapy with a symptom-monitoring wait-list condition in 6 matched pairs of patients with IBS. Hypnotherapy-treated patients had significant improvements in a composite score measuring symptoms of abdominal pain, diarrhea, constipation, bloating, flatulence, belching, and nausea. Individually, symptoms of pain, constipation, and flatulence showed significant improvement. No significant change was seen in depression scores, but significant improvement was seen in anxiety.

Psychotherapy

Four articles on cognitive therapy and psychotherapy were identified. All studies were randomized, controlled trials but were subject to bias. Svedlund et al randomized 101 of 119 recruited outpatients to medical therapy alone or medical therapy plus dynamically oriented individual psychotherapy. At 3 and 15 months, both groups demonstrated improvement in somatic and mental symptoms. Psychotherapy significantly improved total somatic symptom score and abdominal pain at 3 and 15 months and bowel dysfunction at 15 months. Psychopathological symptoms improved similarly between groups.

Psychotherapy was found to be superior to supportive listening in a randomized trial of 102 consecutively recruited patients. The psychotherapy group received 7 treatment sessions during 3 months, while the supportive listening group received 5 sessions during the same period. After 3 months, the psychotherapy group had fewer abdominal symptoms and better quality of life. Psychological symptom scores improved for women but not men.

Greene and Blanchard randomized 20 patients to individualized cognitive therapy or daily symptom monitoring. Treatment consisted of two 1-hour sessions weekly for 2 weeks followed by weekly sessions for the next 6 weeks. Improvement was measured by means of a composite primary symptom reduction (CPSR) score based on symptoms of pain, tenderness, diarrhea, and constipation. Clinically significant improvement was defined as a decrease in the CPSR of 50% or more. Eight of 10 patients receiving cognitive therapy showed clinically significant improvement compared with 1 of 10 in the symptom monitoring group. Sustained improvement was seen at 3-month follow-up.

Cognitive therapy has also been compared with self-help support groups or symptom monitoring in a group of 34 patients with IBS. Individual cognitive therapy was provided in two 1-hour sessions weekly for the first 2 weeks followed by weekly sessions for the next 6 weeks. Self-help support groups met weekly for 8 weeks. During self-help group sessions, educational information regarding IBS was provided and subjects shared experiences regarding their symptoms. Using a 50% or greater reduction in CPSR score as a criterion for clinically significant improvement, improvement occurred in 10 of 12 patients in the cognitive therapy group, 2 of 12 patients in the self-help group, and 1 of 10 patients in the symptom monitoring group. The cognitive therapy group also showed significant improvements on psychological measures of anxiety and depression compared with the other groups. Improvements were maintained at a 3-month follow-up assessment.

Behavior Therapy

Five studies evaluating behavioral therapy met inclusion criteria and 3 compared behavioral with medical therapy. Medical therapy consisted of peppermint oil; a combination of antidepressant-anxiolytic medication, antispasmodic agent, and fiber; and “conventional”
therapy at the discretion of the gastroenterologist. Stress management consisted of weekly interventions for between 4 and 15 weeks. Stress management was superior to peppermint oil in reducing frequency and severity of attacks. In addition, stress-managed patients reported greater confidence regarding their illness. Compliance was only 50% with peppermint oil, however, and a greater percentage of behaviorally-treated patients reported association of symptoms with stress. Conrey et al reported that bowel retraining and pain management significantly reduced food avoidance and domestic avoidance and decreased symptoms of headache, irritability, stomach pain, and constipation. Diarrhea was not improved. Somatic distress, depression, and anxiety also improved over time. Finally, Bennett and Wilkinson demonstrated that a progressive muscle relaxation technique better reduced anxiety than did medical therapy. Digestive symptoms improved similarly in both groups. The duration of this study was only 8 weeks, and 9 of 33 subjects dropped out.

Two studies evaluated relaxation therapy using symptom assessment as a control. Blanchard and colleagues reported that 4 of 8 patients treated with relaxation therapy experienced 50% or greater reduction in CPSR score compared with 1 of 8 control subjects. Relaxation therapy was conducted with 2 sessions during the first week followed by weekly sessions for the next 6 weeks. This was a short-duration trial with posttreatment symptoms assessed 4 weeks after completion of therapy. Lynch and Zambale reported that eight 2-hour sessions of relaxation therapy led to significant reductions in CPSR scores in 7 of 11 subjects compared with none of 10 control subjects. These gains were maintained at 5 months after the treatment phase ended.

**Multicomponent Treatment**

Multicomponent therapy incorporates elements of education, relaxation therapy, biofeedback, and cognitive therapy or psychotherapy. Seven studies met inclusion criteria. Most of the work in this area comes from Blanchard and colleagues. Neff and Blanchard published their initial experience in 1987. They developed an 8-week program consisting of progressive relaxation, thermal biofeedback, education, and stress management. After encouraging results in their initial 4 subjects, 10 patients treated with multicomponent therapy were compared with 9 control subjects. Six of 10 treated patients had 50% or greater reduction in CPSR score compared with 1 of 9 control subjects. Control subjects were subsequently offered therapy, and all subjects were followed up for several years. Reductions in CPSR score of 50% or greater were seen in 8 of 17 patients at 1 year and 8 of 14 patients at 2 years.

Blanchard et al also compared multicomponent therapy with attention placebo and symptom monitoring. The attention placebo group received contact time equivalent to that of the multicomponent therapy group; however, the exposure involved general counseling such as dietary measures and nonspecific support. Initially, 30 patients seeking nondrug therapy for IBS were studied. Two weeks after therapy was completed, CPSR score reductions of 50% or more were seen in 6 of 10 patients treated with multicomponent therapy and 5 of 10 patients treated with attention placebo. Two of 10 patients in the symptom-monitoring group improved. The authors then increased sample sizes in each group and followed the same protocol with the exception that follow-up was performed 4 weeks after completing interventions. Reductions in CPSR score of 50% or greater were seen in 16 of 31 subjects in the multicomponent therapy group, 14 of 30 patients treated with attention placebo, and 10 of 31 control subjects. Differences between groups were not significant.

Guthrie et al compared psychotherapy, relaxation, and medical therapy with medical therapy alone. One hundred two of 115 consecutively recruited patients with medically refractory IBS were assessed at baseline and 3 and 12 months. After 3 months, treated patients had significantly less pain, distention, and diarrhea, but not constipation. Assessments by blinded gastroenterologists confirmed improvements in pain and diarrhea. Follow-up interviews at 1 year showed that 28 of 31 patients initially considered improved had sustained improvement. In the control group, 4 of 10 patients with spontaneous improvement remained improved at 1 year. Thirty control subjects were subsequently treated with multicomponent therapy and 21 of 30 improved.

A multicomponent model using education, relaxation therapy, and cognitive therapy along with medical therapy was compared with medical therapy alone in consecutively recruited patients with IBS. Twenty-four of 26 randomized patients completed the study. Multicomponent behavioral therapy led to significant reductions in overall symptom scores as well as improved well-being, quality of life, and perceptions of control of health. Rectovisceral perception assessed by balloon distention was unchanged.

**Meta-analysis of Psychological Therapies**

Included studies evaluating psychological therapies are summarized in **Table 2**. Overall, these studies are highly subject to bias. None was well blinded, and only 2 studies reported the assessor to be blinded as well. While responses to psychological interventions appear robust, the control group was typically symptom monitoring alone. In that regard, there is no true placebo group and it is difficult to estimate the true net therapeutic gain. It is possible to evaluate studies that included a true placebo group. Payne and Blanchard compared cognitive therapy with support groups, while Blanchard and colleagues compared a multicomponent behavioral therapy with an attention placebo control. Shaw et al compared stress management with a peppermint oil–treated group. Several other studies used appropriate control groups, but results were not reported in a way that allowed inclusion in the meta-analysis.
Table 2. Overview of Included Trials of Psychological Therapies in Irritable Bowel Syndrome

<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnostic Criteria</th>
<th>Design</th>
<th>No. of Patients Entered</th>
<th>No. of Dropouts</th>
<th>Treatment Period, wk</th>
<th>Jadad Score (0-5)*</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galovski and Blanchard</td>
<td>Symptoms</td>
<td>Randomized; blinding not certain</td>
<td>12</td>
<td>2</td>
<td>12</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 6/10 with hypnotherapy and 0/6 with symptom monitoring</td>
</tr>
<tr>
<td>Whorwell et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized, unblinded</td>
<td>30</td>
<td>NR</td>
<td>12</td>
<td>1</td>
<td>Hypnotherapy significantly better than supportive psychotherapy for pain, distention, abnormal bowel habit, and general well-being</td>
</tr>
<tr>
<td>Prior et al.</td>
<td>Symptoms</td>
<td>Nonrandomized, unblinded</td>
<td>30</td>
<td>2</td>
<td>12</td>
<td>1</td>
<td>Hypnotherapy improved symptoms in 13/15, but did not change tolerance to rectal balloon distention</td>
</tr>
<tr>
<td>Greene and Blanchard</td>
<td>Symptoms</td>
<td>Randomized; blinding not certain</td>
<td>20</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 8/10 with cognitive therapy and 1/10 with symptom monitoring</td>
</tr>
<tr>
<td>Guthrie et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; outcome assessor blind</td>
<td>102</td>
<td>13</td>
<td>12</td>
<td>2</td>
<td>Psychotherapy superior to supportive listening with significant improvement in physical and psychological symptoms; women responded better than men</td>
</tr>
<tr>
<td>Svedlund et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; blinding not certain</td>
<td>101</td>
<td>2</td>
<td>12</td>
<td>2</td>
<td>Psychotherapy group with significantly greater reductions in scores for abdominal pain and bowel dysfunction than medical therapy alone; psychological scores not significantly different</td>
</tr>
<tr>
<td>Payne and Blanchard</td>
<td>Rome†</td>
<td>Randomized; blinding not certain</td>
<td>34</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 9/12 with cognitive therapy, 3/12 with supportive therapy, and 1/10 with symptom monitoring</td>
</tr>
<tr>
<td>Blanchard et al.</td>
<td>NR</td>
<td>Randomized; blinding not certain</td>
<td>23</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 4/8 with relaxation training and 1/8 with symptom monitoring</td>
</tr>
<tr>
<td>Lynch and Zamble</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; blinding not certain</td>
<td>27</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 7/11 with behavioral therapy and 0/10 with symptom monitoring</td>
</tr>
<tr>
<td>Corney et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; blinding not certain</td>
<td>42</td>
<td>1</td>
<td>6-15</td>
<td>2</td>
<td>No difference between behavioral psychotherapy and medical treatment for symptoms; both groups significantly improved</td>
</tr>
<tr>
<td>Bennett and Wilkinson</td>
<td>NR</td>
<td>Randomized; blinding not certain</td>
<td>33</td>
<td>9</td>
<td>8</td>
<td>2</td>
<td>Stress management superior to medical management for pain, discomfort, stool frequency, and anxiety</td>
</tr>
<tr>
<td>Shaw et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; blinding not certain</td>
<td>35</td>
<td>0</td>
<td>24</td>
<td>1</td>
<td>Stress management significantly better than peppermint oil</td>
</tr>
<tr>
<td>Neff and Blanchard</td>
<td>NR</td>
<td>Randomized; blinding not certain</td>
<td>19</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 6/10 with multicomponent behavioral therapy and 1/9 with symptom monitoring</td>
</tr>
<tr>
<td>Blanchard et al.</td>
<td>NR</td>
<td>Randomized; blinding not certain</td>
<td>30</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 6/10 with multicomponent behavioral therapy, 5/9 with attention placebo, and 2/10 with symptom monitoring</td>
</tr>
<tr>
<td>Blanchard et al.</td>
<td>NR</td>
<td>Randomized; blinding not certain</td>
<td>145</td>
<td>53</td>
<td>8</td>
<td>2</td>
<td>Composite symptom score ≥50% improved in 16/31 with multicomponent behavioral therapy, 14/30 with attention placebo, and 10/31 with symptom monitoring</td>
</tr>
<tr>
<td>Guthrie et al.</td>
<td>Symptoms and negative evaluation</td>
<td>Randomized; outcome assessor blind</td>
<td>102</td>
<td>13</td>
<td>12</td>
<td>2</td>
<td>Psychotherapy, relaxation, and medical treatment significantly better than medical treatment alone for reducing pain and diarrhea but not constipation</td>
</tr>
<tr>
<td>Heymann-Monnikes et al.</td>
<td>Rome†</td>
<td>Randomized; blinding not certain</td>
<td>26</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>Multicomponent behavioral therapy superior to medical therapy for symptoms, well-being and quality of life; no differences for rectovesical perception by barostat</td>
</tr>
</tbody>
</table>

Abbreviation: NR, not reported.
*Explained in Jadad et al. 14
†Explained in Chey et al. 16
meta-analysis are shown in Figure 2. Psychological therapy was modestly favored over other interventions. Comparisons made with a fixed-effects model returned an odds ratio (95% confidence interval) of 2.38 (1.19-4.68). There was no significant heterogeneity among studies ($\chi^2 = 5.90, df = 3, P = .12$).

The difficulties encountered in treating IBS often lead physicians and patients to seek unconventional therapies. This review explored treatment options beyond the scope of commonly used therapies. For many therapies, no published medical literature could be found. For reviewable therapies, available literature varied greatly in both depth and quality.

No therapy could be considered well supported by existing literature, but the Chinese herbal medicine and psychological therapy currently offer the best evidence. The single trial of Chinese medicine is quite rigorous but obviously requires replication. This study raises interesting questions. Is there a subset of patients with IBS who are more likely to benefit from Chinese herbal medicine? Are there symptoms or psychological traits that predict response? It is equally important to understand why herbal therapy appears efficacious. Given the scarcity of effective pharmacologic agents to treat IBS, the potential for drug development would be significant.

While Chinese medicine offers only one study of high quality, psychological therapies offer many studies of lesser quality. These studies are highly prone to selection bias, as enrolled patients generally view this therapy favorably. Many of the studies are further degraded by the absence of a true control group. Given the generous placebo response that accompanies trials of functional bowel disorders, symptom monitoring alone is an inadequate control. Trials with reasonable control groups report more modest benefits or show no benefit at all. These trials are further hampered by the absence of clear blinded conclusions. Only 2 of the included trials of psychological therapy reported that the assessor was blinded. Although the coexistence of psychopathology in IBS is well established, and psychotherapy would intuitively seem effective, better studies are needed.

Dietary factors play an important role in symptom generation for many patients with IBS. True food allergy is extremely uncommon, while food intolerance is quite common. Elimination of offending foodstuffs is reasonable if a clear trigger is seen, but elimination diets are difficult and may have adverse nutritional consequences. Elimination diets and oral cromolyn appear equally efficacious in the treatment of unexplained chronic diarrheal illness, which would make cromolyn a reasonable choice before elimination diets are initiated.

Carbohydrate intolerance in IBS is probably much more common than carbohydrate malabsorption. Lactose and fructose intolerance may not be more prevalent in IBS than in the baseline population, but patients with IBS develop greater symptoms as a result of exposure. Elimination of offending dietary substances appears beneficial, but use of lactase has not been shown to be effective. At present, it would seem that breath testing might not confer diagnostic advantages over a careful dietary history.

The role of gut flora in IBS is being actively investigated. Attention has recently been focused on bacterial overgrowth and postsurgical IBS, but both areas require further clarification. Small-intestinal bacterial overgrowth should be considered in patients with compatible symptoms and a predisposition to that disorder (diabetic, scleroderma, postsurgical anatomy, etc.). The role of bacterial overgrowth in IBS awaits the results of well-designed prospective trials. Studies of postinfectious IBS are needed that address whether symptom origination is physiological or psychological. Although alteration of intestinal flora is an appealing and potentially therapeutically rewarding area of investigation, current studies do not support the routine use of probiotics in patients with IBS and large, placebo-controlled, double-blind trials need to be performed.

Finally, the efficacy of digestive aids such as peppermint oil remains to be seen. While a modest benefit is suggested by meta-analysis of available controlled trials evaluating peppermint oil, the brief duration of therapy in these trials mandates caution when the results are interpreted. Ginger has been studied primarily in the setting of postoperative nausea and vomiting. Its use in IBS is unstudied. The use of digestive enzymes beyond lactase has not been clearly evaluated and cannot be recommended.

In conclusion, a wide variety of alternative therapies are presently used in the management of IBS. Although there are likely to be alternative therapies that are efficacious in the management of this condition, none has made a strong case based on existing medical evidence to date. Additional studies need to be performed in this area with careful attention to trial design and outcome measures.
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