Interdisciplinary Research in Medical Sciences Specialty
ISSN: 3062-4401
2021, Volume 1, Issue 2, Page No: 92-106

Available online at: www.galaxypub.co/page/journals

Galaxy Publication

Efficacy and Safety of Combined Herbal Medicine and Conventional Treatment in Guillain-Barré Syndrome: A Meta-Analysis of Randomized Controlled Trials

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Received: 04 August 2021; **Revised:** 14 October 2021; **Accepted:** 16 October 2021

ABSTRACT

Guillain–Barré syndrome (GBS) is a rapidly progressing condition in which immune-mediated injury affects peripheral nerves. Because widely accepted treatment protocols emphasize acute-phase care, rehabilitation, and long-term management often remain insufficient. In East Asia, herbal formulas have historically been applied to support GBS recovery, leading to interest in their adjunctive potential. This study was therefore designed to assess clinical data regarding herbal interventions for GBS and outline future research directions. Searches were performed in PubMed, Embase, Cochrane, CNKI, CiNii, and Science ON from database inception through December 4, 2024. Randomized controlled trials (RCTs) comparing conventional Western medicine (CWM) plus herbal therapy (treatment) versus CWM alone (control) were included to determine the added value of herbal medicine for GBS. All references were organized using EndNote X9 (Clarivate Analytics). Meta-analysis was completed with Review Manager (Revman) 5.4.1. Outcomes included Total Effective Rate (TER), Modified Barthel Index (mBI), and Manual Muscle Testing (MMT). Safety was evaluated through reported significant adverse events (AEs).

Ten RCTs involving 764 participants met the criteria. Meta-analytic results showed a significant increase in TER in the combination-therapy group relative to controls (risk ratio: 1.14, 95 % CI: 1.09–1.20, $p < 0.00001$). mBI and both upper- and lower-limb MMT scores were also markedly higher in the treatment group. None of the included trials documented meaningful AEs. Findings indicate that pairing CWM with herbal medicine may offer a more effective and safer path to functional rehabilitation for individuals with GBS. Additional rigorously designed studies are needed to confirm these observations.

Keywords: Guillain–Barré syndrome, Traditional East Asian medicine, Herbal medicine, Systematic review and meta-analysis

How to Cite This Article: Hernández C, Morales J, Fernández D. Efficacy and Safety of Combined Herbal Medicine and Conventional Treatment in Guillain-Barré Syndrome: A Meta-Analysis of Randomized Controlled Trials. Interdiscip Res Med Sci Spec. 2021;1(1):92-106. https://doi.org/10.51847/XWWzBg81tB

Introduction

Guillain–Barré syndrome (GBS) is an acute immune-mediated neuropathy that typically begins with weakness in the legs and advances upward [1]. Outcomes vary widely: with timely acute treatment, roughly 80 % of affected individuals regain the ability to walk within six months, whereas severe cases may experience prolonged or even permanent deficits exceeding three years [2]. In South Korea, the number of patients seeking care for GBS has steadily increased over the last decade, with figures in 2018 nearly twice those in 2002 [3]. Following the World Health Organization's declaration of COVID-19 as a pandemic in 2020, vaccines and therapeutics were rapidly introduced, leading to speculation about potential links between COVID-19 and GBS, as some reports suggest that both infection and vaccination may trigger GBS within two weeks [4–8]. As respiratory illnesses and vaccinations are known precipitating factors [1], the heightened exposure resulting from the pandemic may partly explain the rise in GBS diagnoses.

Acute management of GBS generally relies on high-dose intravenous immunoglobulin and plasmapheresis, followed by supportive care, rehabilitation, and prevention of secondary complications [2]. Emerging research

into remyelination therapies for demyelinating conditions, including GBS, is ongoing [9]. Despite this, routine treatments mainly address early-stage pathology and show limited efficacy in dealing with persistent symptoms such as weakness, sensory issues, pain, and fatigue [10]. The increased incidence related to COVID-19 and the insufficient coverage of chronic sequelae highlight the need for alternative therapeutic approaches [11].

Traditional East Asian Medicine (TEAM), including Korean medicine, has long applied herbal treatments for GBS. Prior work includes a review focused on Traditional Chinese Medicine journals [12], a meta-analysis of acupuncture RCTs published in Chinese literature [13], and a review of Korean case reports [14]. However, these earlier studies were restricted by their narrow source selection, and no comprehensive systematic review and meta-analysis of RCTs assessing herbal medicine as a primary intervention has been performed. The present study, therefore, evaluates the effectiveness and safety of herbal medicine compared with both conventional Western medicine (CWM) and standalone interventions to determine its potential as an alternative therapy for GBS.

Materials and Methods

Protocol registration

This systematic review and meta-analysis were carried out following the National Evidence-Based Healthcare Collaborating Agency guidelines for evaluating interventional evidence [15]. The research plan was filed with the Research Registry on December 18, 2023 (registration number: 1757). The procedures adhered to the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations [16].

Database and literature search

We examined domestic and international publications related to herbal interventions for GBS through December 4, 2024. Searches were conducted in six databases: PubMed, EMBASE, Cochrane CENTRAL, CNKI, CiNii, and the Korean database Science ON. Search terms included “Guillain-Barré Syndrome,” “GBS,” along with keywords related to herbal therapies such as “Chinese Herbal,” “Chinese Plant Extracts,” “Chinese Drug,” “Chinese Medicine,” “Traditional Medicine,” “Korea Medicine,” “Korean Medicine,” “Oriental Medicine,” “East Medicine,” “East Asia Medicine,” “Alternative medicine,” “Complementary medicine,” “Kampo,” “Herbal Medicine,” “Herb,” “Herbal,” “Decoction.” Terms associated with trial design—“Randomized controlled trial,” “RCT,” “Randomized,” and “Randomly”—were also applied. Supplement 1 contains the complete search strategy for each database.

Inclusion and exclusion criteria

Study design

Only randomized controlled trials (RCTs) were eligible, with no restrictions on publication year or language. Non-randomized studies, case reports, laboratory-based research, protocols, and review articles were excluded.

Study participants

Eligible studies enrolled individuals diagnosed with GBS using clinical evaluation and diagnostic findings. There were no exclusions based on GBS subtype, sex, age, ethnicity, severity, duration of illness, or treatment length.

Treatment groups

Trials in which the intervention group received herbal preparations together with CWM were included. Trials administering orally taken herbal formulas alone were also accepted. No limits were placed on dosage, administration frequency, treatment length, or form (capsule, tablet, decoction, pill, extract). Studies combining herbal medicine with other TEAM procedures—such as acupuncture, moxibustion, cupping, pharmacopuncture, or injected herbal preparations—were excluded.

Control groups

Control groups receiving only CWM or CWM plus placebo were considered acceptable. Studies were excluded if the control arm involved any therapy other than CWM.

Outcome measurements

Any variables measuring therapeutic efficacy or safety of the interventions were accepted as outcome indicators.

Data collection and analysis

Two reviewers (SJ and SK) independently extracted and analyzed the data. Information from all retrieved records was organized using EndNote X9 (Clarivate Analytics, Philadelphia, USA). In the initial screening stage, duplicates were removed, and titles and abstracts were examined to exclude irrelevant studies or non-RCTs. In the subsequent stage, full texts were assessed to eliminate studies that did not meet the inclusion criteria. The entire selection process was documented using a PRISMA flow diagram. From the final dataset, details such as author, publication year, sample characteristics (number, sex, age, treatment duration), intervention type, outcome assessments, findings, and adverse events (AEs) were obtained. Discrepancies were resolved through consensus.

Quality assessment

Quality appraisal was conducted independently by SJ and SK using the Cochrane Risk of Bias (RoB) tool. Each study was evaluated for seven sources of bias: selection bias (random sequence generation and allocation concealment), performance bias, detection bias, attrition bias, reporting bias, and additional biases. Each domain was rated as “low risk,” “high risk,” or “unclear” according to the Cochrane Handbook for Systematic Reviews of Interventions version 5.1.0 [17]. Conflicts were resolved by agreement between reviewers.

Statistical analysis

Data synthesis and all statistical procedures were carried out using Review Manager (RevMan) 5.4.1 (Cochrane, London, UK). Analyses were conducted only when a quantitative combination was feasible. The generalized inverse variance method was used for meta-analysis. Dichotomous variables were summarized using risk ratios (RR) with 95 % confidence intervals (CI), and continuous variables were expressed as mean differences (MD) with 95 % CI. Statistical significance was defined as $p < 0.05$. Methodological heterogeneity was assessed based on design variability and risk of bias; studies showing extreme heterogeneity were omitted. Clinical heterogeneity was addressed by excluding trials whose interventions differed substantially from those of others. Statistical heterogeneity was measured using Higgins’ I2 statistic, with values ≥ 50 % considered indicative of heterogeneity [18]. Publication bias was evaluated through visually inspecting funnel plot asymmetry.

Results and Discussion

Study selection

Database searches yielded 47 initial citations. After eliminating 13 duplicate records, 34 entries remained for eligibility screening. Title/abstract checks removed six non-RCT designs, seven papers not focused on GBS, and three studies where the intervention did not consist exclusively of orally administered herbal preparations. Full-text review excluded an additional four non-RCTs, two papers with unsuitable comparator groups, and two studies in which herbs were not delivered orally. In total, ten investigations [19–28] satisfied all inclusion criteria **(Figure 1)**.

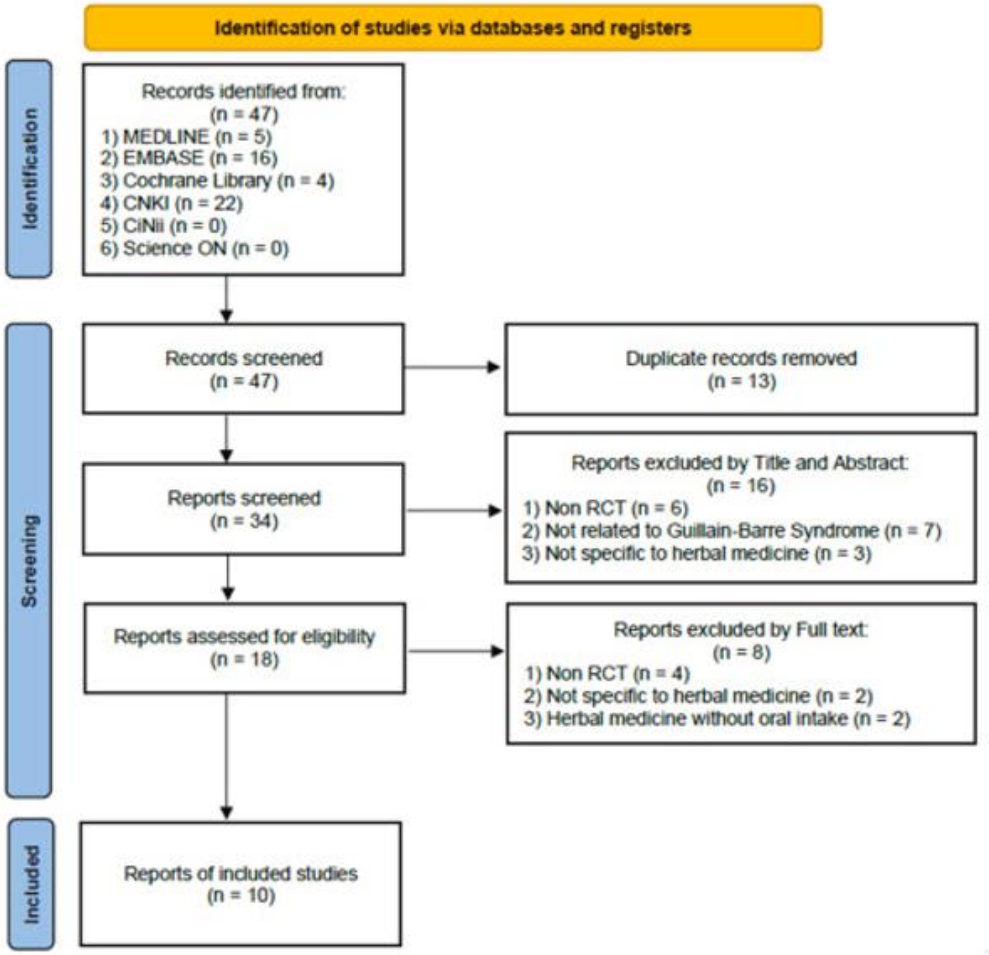


Figure 1. PRISMA diagram. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; EMBASE, Excerpta Medica dataBASE; CNKI, China National Knowledge Infrastructure; CiNii, Citation Information by National Institute of Informatics; RCT, Randomized Controlled Trial.

Characteristics of included studies

Across all eligible trials, 764 participants were evaluated: 389 assigned to herbal therapy and 375 receiving control treatments. None of the reports described significant baseline discrepancies between groups **(Table 1)**. Diagnostic standards for GBS were explicitly stated in nine publications [19–26, 28], while one study [27] did not specify its diagnostic source (Supplement 2). Xiaoxuming decoction appeared in two trials [19, 23], and the Fuzheng Qingre prescription likewise appeared in two [20, 21]. The TEAM pattern most frequently cited was damp-heat, appearing in five studies [20, 21, 23, 25, 28]. Glycyrrhizae Radix et Rhizoma was the most commonly included herb, used in eight papers [19–24, 26, 28]. Astragali Radix [20–22, 24, 26, 28] and Paeoniae Radix Rubra [19–21, 23, 25, 27] each appeared in six trials (Supplement 3). When herbs were classified according to TEAM functional categories, heat-clearing agents were counted 27 times, qi-supporting herbs 15 times, and blood-regulating/stasis-resolving herbs 12 times **(Figure 2)**. All RCTs prescribed comparable CWM regimens across study arms **(Table 2)**.

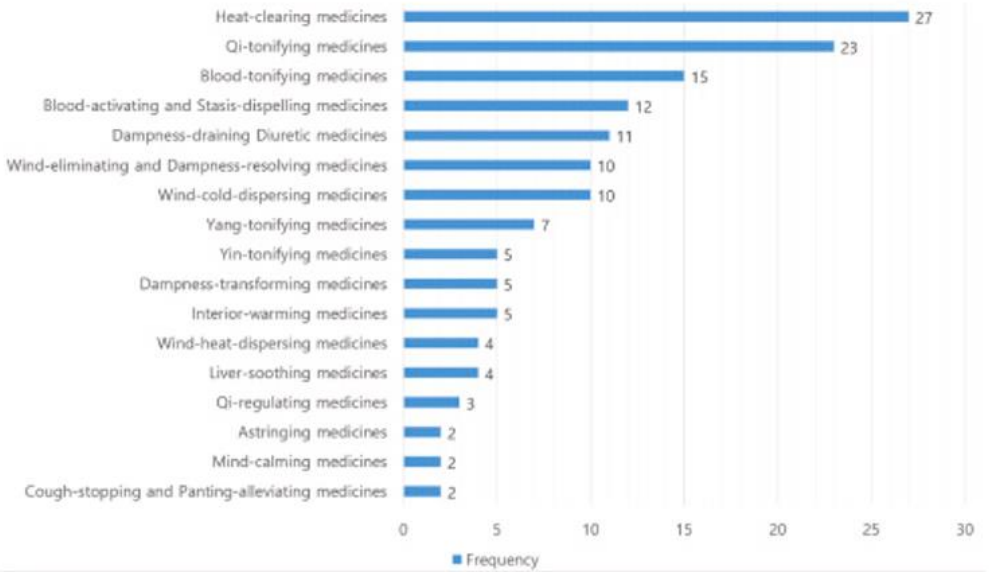


Figure 2. Distribution of herbal components by TEAM functional classification. TEAM, Traditional East Asian Medicine.

Table 1. Characteristics of included studies.

Author (Year)	Sample size (Treatment : Control)	Sex (Male/Female)	Mean age ± SD (years)	Duration of disease ± SD
Wu *et al.* (2021) [19]	92 (46:46)	T: 24/22 C: 25/21	T: 7.65 ± 1.06 C: 7.46 ± 1.03	T: 4.61 ± 1.22 years C: 4.63 ± 1.29 years
Yang and Zhao (2020) [20]	63 (35:28)	T: 24/11 C: 19/9	T: 40.1 ± 16.9 C: 37.8 ± 14.0	T: 6.31 ± 4.46 days C: 6.75 ± 3.82 days
Zhao and Gao (2019) [21]	74 (37:37)	T: 25/12 C: 23/14	T: 40.1 ± 16.9 C: 37.8 ± 14.0	T: 6.6 ± 3.9 days C: 6.3 ± 3.7 days *Dropout: 11 (2:9)
Wang and Tian (2019) [22]	59 (30:29)	T: 19/11 C: 17/12	T: NR C: NR	T: 5.93 ± 2.12 days C: 5.34 ± 2.24 days
Shen *et al.* (2018) [23]	104 (52:52)	T: 29/23 C: 31/21	T: 38.12 ± 5.27 C: 37.85 ± 5.19	T: 29.48 ± 3.06 hours C: 28.96 ± 3.02 hours
Yang *et al.* (2016) [24]	60 (30:30)	T: 18/12 C: 16/14	T: 47.5 C: 48.1	T: 1–6 months C: 1–6 months
Gong *et al.* (2007) [25]	100 (50:50)	T: 30/20 C: 28/22	T: NR C: NR	T: 1–5 days C: 1–5 days
Guo *et al.* (2004) [26]	72 (36:36)	T: 22/14 C: 23/13	T: 40.5 ± 4.0 C: 41.5 ±	NR
Xie (2003) [27]	65 (32:33)	T: NR C: NR	T: 33 C: 32.5	T: 5.6 days C: 5.8 days
Ding *et al.* (1992) [28]	86 (43:43)	T: 30/13 C: 31/12	T: 26.5 C: 27.5	T: 2–7 days C: 2–7 days

T = treatment; C = control; M = mean; SD = standard deviation; NR = not reported; h = hours; d = days; m = months; y = years.

Table 2. Summary of RCT evidence on herbal interventions for Guillain–Barré syndrome.

Author (Year)	Treatment Group (Herbal + Conventional)	Control Group (Conventional only)	Treatment Duration	Main Outcome Measures	Key Results (Treatment vs Control)	Adverse Events
Wu *et al.* (2021) [19]	Conventional therapy + **Xiaoxuming decoction** (twice daily, for 2 weeks)	IV immunoglobulin 0.4 g/(kg·d) for 2 weeks IV methylprednisolone 20–30 mg/kg for 2 weeks	2 weeks	① Recovery time ② Modified Barthel Index (MBI) ③ Neurologic Disability Scale (NDF) ④ Manual Muscle Testing (MMT) ⑤	All ①–⑧ significantly better in treatment group (P < 0.05)	Not reported

				Inflammatory factors (IL-18, IL-12, IL-1β in serum & CSF) ⑥ Immune markers (CD3+, CD4+, CD4+/CD8+ in CSF) ⑦ Immune markers (CD8+, CSF protein) ⑧ Total effective rate (TER)		
Yang and Zhao (2020) [20]	Conventional therapy + **Fuzheng Qingre formula** (twice daily, for 1 month)	Conventional supportive care + IV gamma globulin 0.4 g/(kg·d) for 5 days IV vitamin B6 0.2 g/day for 5 days IM vitamin B12 0.5 mg/day for 5 days	1 month	① TCM syndrome score ② MBI score ③ Hughes functional grading scale ④ Sensory dysfunction score ⑤ Motor conduction velocity (MCV) – median, ulnar, common fibular nerves ⑥ Distal motor latency (DML) – median & common fibular nerves ⑦ Sensory conduction velocity (SCV) – median nerve ⑧ Sensory nerve action potential (SNAP) – median, ulnar, common fibular nerves ⑨ TER	①–⑦ and ⑨ significantly better in treatment (P < 0.05 or P < 0.01) ⑧ no difference (P > 0.05)	Not reported
Zhao and Gao (2019) [21]	Conventional therapy + **Fuzheng Qingre formula** (twice daily, for 1 month)	Conventional supportive care + IV immunoglobulin 0.4 g/(kg·d) for 5 days IV vitamin B6 0.2 g/day for 5 days IM vitamin B12 0.5 mg/day for 5 days	1 month	① MBI score ② DML – median nerve ③ MCV – median & ulnar nerves ④ SCV – median nerve ⑤ Hughes functional grading scale ⑥ TER	All significantly better in treatment group (P < 0.05 or P < 0.01)	Not reported
Wang and Tian (2019) [22]	Conventional therapy + **Modified Qingzao Tang** (twice daily, for 4 weeks)	Conventional symptomatic care + IV immunoglobulin 0.4 g/(kg·d) for 5 days IM vitamin B12 0.5 mg/day IM for 2 weeks IM vitamin B1 0.1 g/day for 2 weeks	2 courses (2 weeks each)	① MMT score ② MBI score ③ TER (muscle strength & MBI) ④ TER (TCM syndrome score)	All significantly better in treatment group (P < 0.01 or P < 0.05)	Not reported
Shen *et al.* (2018) [23]	Conventional therapy + **Xiaoxuming Tang** (twice daily, for 2 weeks)	Basic supportive care + IV immunoglobulin 0.4 g/(kg·d) for 5 days	2 courses (1 week each)	① MBI score ② Sensory system score (SSS) ③ CSF protein content ④ TER	All significantly better in treatment group (P < 0.05)	T: 1.92% (nausea & vomiting, 1 case) C: 5.77% (mild fever 2 cases, dizziness & nausea 1 case)

Yang *et al.* (2016) [24]	Conventional therapy + **Qiangjin Tang** (three times daily, for 3 months)	Basic care + rehabilitation + vitamins B1, B6, B12	3 courses (1 month each)	① MMT score ② Hughes functional grading scale ③ TER	① and ③ significantly better in treatment ($P < 0.05$) ② no difference ($P > 0.05$)	Not reported
Gong *et al.* (2007) [25]	Stage-specific herbal medicine: • Acute: Simiao San • Early recovery: Buyanghuanwu Tang • Late recovery: Huqian Wan (each stage 20 days)	Comprehensive conventional care (ribavirin, vitamins, dexamethasone → prednisone taper, antibiotics when needed, CDP-choline, dipyridamole, etc.)	60 days total	Total apparent efficiency and TER at 30 and 60 days	Treatment superior at 30 days ($P < 0.05$) TER superior at 30 days, no difference at 60 days ($P > 0.05$)	Not reported
Guo *et al.* (2004) [26]	Conventional therapy + **Daqinjiao Tang** (twice daily)	Conventional care + dexamethasone 10 mg/day (<2 weeks) + vitamins + supportive medications	Variable (1–6 courses for T 3–10 courses for C) (1 course = 7 days)	① Cure rate ② TER	Both significantly higher in treatment group ($P < 0.01$ and $P < 0.05$)	Not reported
Xie (2003) [27]	Conventional therapy + Herbal medicine (unspecified) (three times daily)	Conventional supportive + acute-phase high-dose vitamins, corticosteroids, antibiotics	10 days	① Time to cessation of paralysis progression ② Time to recovery of muscle strength	Both significantly shorter in treatment group ($P < 0.01$)	Not reported
Ding *et al.* (1992) [28]	Acute-phase **Maqianzi San** (dose escalated: 0.3 g/d → 0.8 g/d → 0.75–0.9 g/d across 5 courses)	Immunosuppressants + vitamins + antibiotics/tracheotomy if needed + loratadine + isosorbide dinitrate	5 courses (10 days treatment + 6 days rest each)	① MMT score ② TER	Both significantly better in treatment group ($P < 0.01$)	None in either group

T = Treatment; C = Control; NR = Not reported; C-Tx = Control treatment; h = hours; d = days; m = months; y = years; I.V. = Intravenous; I.M. = Intramuscular; P.O. = Per oral; TER = Total effective rate; MBI = Modified Barthel Index; NDF = Neurological deficit score; MMT = Manual muscle testing; SSS = Scandinavian stroke scale; MCV = Motor conduction velocity; SCV = Sensory conduction velocity; DML = Distal motor latency; SNAP = Sensory nerve action potentials; Anti = Antibiotics; CSF = Cerebrospinal fluid; ATP = Adenosine triphosphate; CDP-choline = Cytidine diphosphocholine.

Outcomes of efficacy of herbal medicine on GBS

Therapeutic effectiveness was examined in nine studies [19–26, 28] using the total effective rate (TER). Treatment-group TERs ranged from 83–100 %, whereas control-group values varied between 53–93.10 %. All nine trials favored the herbal interventions, and all but one [26] reached statistical significance ($p < 0.05$). In the five studies using the MBI [19–23], the treatment arm consistently showed more pronounced gains ($p < 0.05$). All four trials that measured MMT [19, 22, 24, 28] likewise demonstrated superior improvements in the herbal medicine groups ($p < 0.05$). Among the three studies employing the Hughes functional grading scale [20, 21, 24], treatment groups reported greater functional recovery, with two achieving statistical significance ($p < 0.05$). Both investigations reporting recovery duration [19, 27] indicated shorter recovery times for the herbal arm ($p < 0.05$).

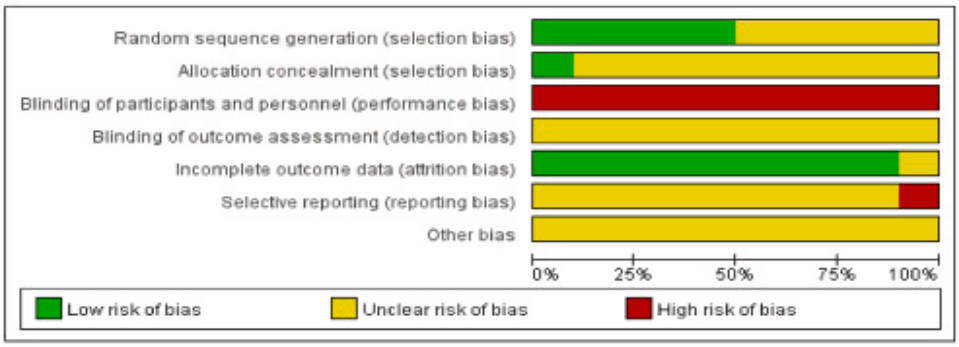
For MCV, SCV, and DML, the two relevant studies [20, 21] showed significant advantages for herbal therapy ($p < 0.05$) **(Table 2)**.

Outcomes of the safety of herbal medicine on GBS

Safety was discussed in two trials [23, 28]. Ding *et al*. [28] identified no adverse events. Shen *et al*. [23] noted one case of nausea/vomiting (1.92 %) in the treatment cohort and three minor AEs (5.77 %) in the control arm—two instances of fever and one involving dizziness accompanied by nausea **(Table 2)**.

Risk of bias evaluation

Bias assessments are depicted in **Figure 3**. For sequence generation, four studies [21–24] utilized random-number tables, and one [19] relied on shuffled envelopes; both approaches were deemed low risk. Allocation concealment was considered adequately handled only in one study [19], which used sealed, serialized opaque envelopes. Performance bias was unavoidably high across all trials because blinding was infeasible for visually distinct interventions. Detection bias remained unclear, as none of the papers documented blinding of outcome evaluators. Attrition bias was low for all except one trial [21], which reported missing data. For selective reporting, one study [20] was judged high risk due to incomplete outcome disclosure. Other sources of bias were evaluated as unclear across all included trials.



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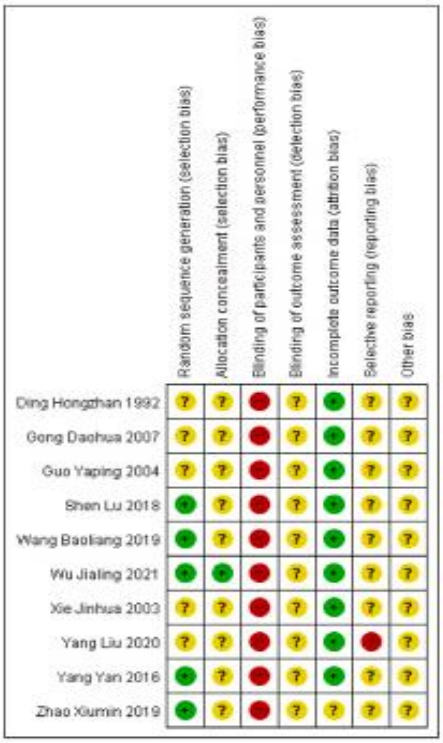

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Figure 3. (a) Overview of bias risk (b) Bias risk summary ("+" = low bias risk; "–" = high bias risk; "?" = unclear bias risk).

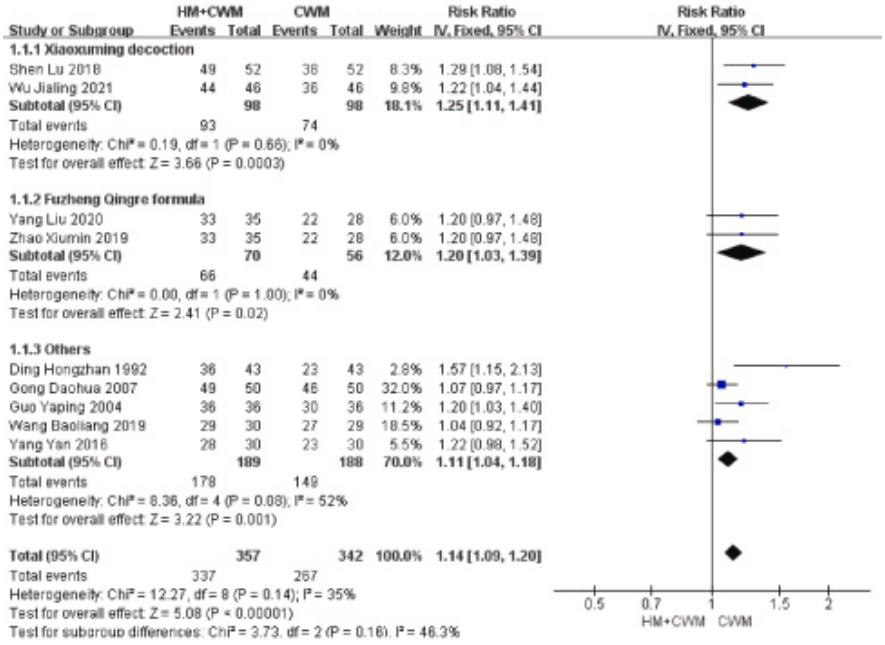
Meta-analysis

Studies reporting identical outcome indicators were combined quantitatively, enabling comparison of treatment effects. Trials using the same herbal formula were placed into subgroups (Xiaoxuming decoction subgroup and Fuzheng Qingre formula subgroup), so their therapeutic effects could be assessed separately.

TER

TER was reported in 9 studies [19–26, 28]. The pooled estimate favored the treatment arm, with low between-study variability (RR: 1.14, 95% CI: 1.09–1.20, $p < 0.00001$, $I^2 = 35\%$). The funnel diagram showed asymmetry, suggesting potential publication bias.

For subgroup analyses, the Xiaoxuming decoction subgroup (2 studies, [19, 23]) demonstrated a clear benefit for the treatment groups with no heterogeneity (RR: 1.25, 95% CI: 1.11–1.41, $p = 0.0003$, $I^2 = 0\%$). The Fuzheng Qingre formula subgroup (2 studies, [20, 21]) also showed a significant advantage for treated participants with similarly no heterogeneity (RR: 1.20, 95% CI: 1.03–1.39, $p = 0.02$, $I^2 = 0\%$) **(Figure 4)**.



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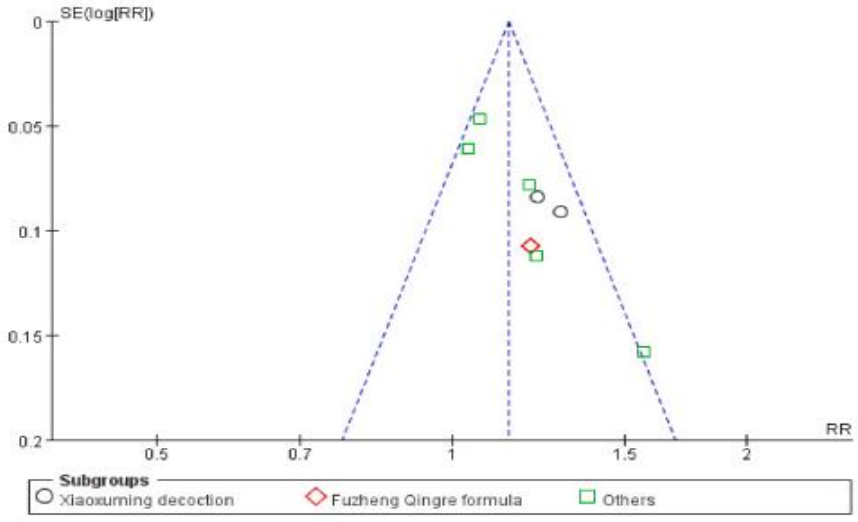


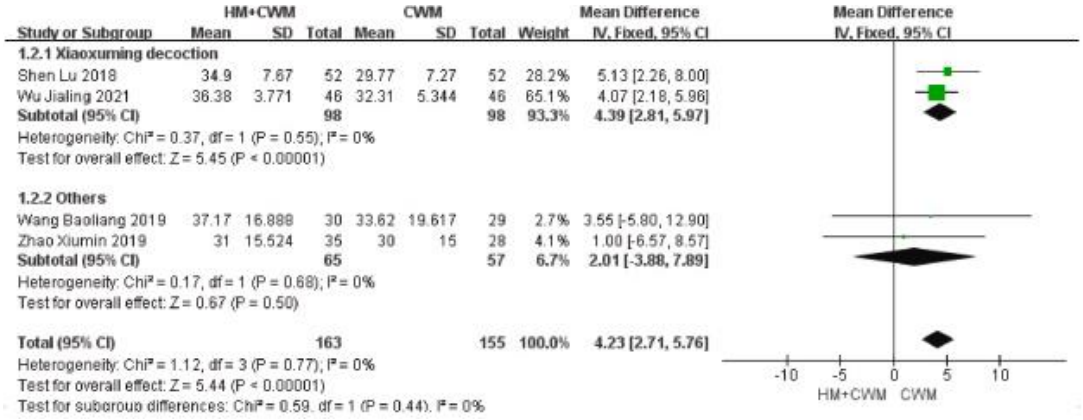
b)

Figure 4. (a) Forest plot for TER: HM + CWM vs. CWM (b) Funnel plot for TER: HM + CWM vs. CWM. TER, Total Effective Rate; HM, herbal medicine; CWM, conventional Western medicine; CI, confidence interval; **SE, standard error.**

MBI

MBI outcomes were documented in 4 studies [19, 21–23]. The treatment groups achieved significantly greater improvements, and heterogeneity was absent (MD: 4.23, 95% CI: 2.71–5.76, p < 0.00001, I^2 = 0%). Given that the minimal clinically important difference (MCID) for MBI in stroke populations is 1.85 [29], the observed mean difference of 4.23 indicates a meaningful clinical effect.

Funnel plot asymmetry suggested possible publication bias. In subgrouping, the Xiaoxuming decoction analyses (2 studies, [19, 23]) again showed significant benefit with no heterogeneity (MD: 4.39, 95% CI: 2.81–5.97, p < 0.00001, I^2 = 0%) **(Figure 5)**.



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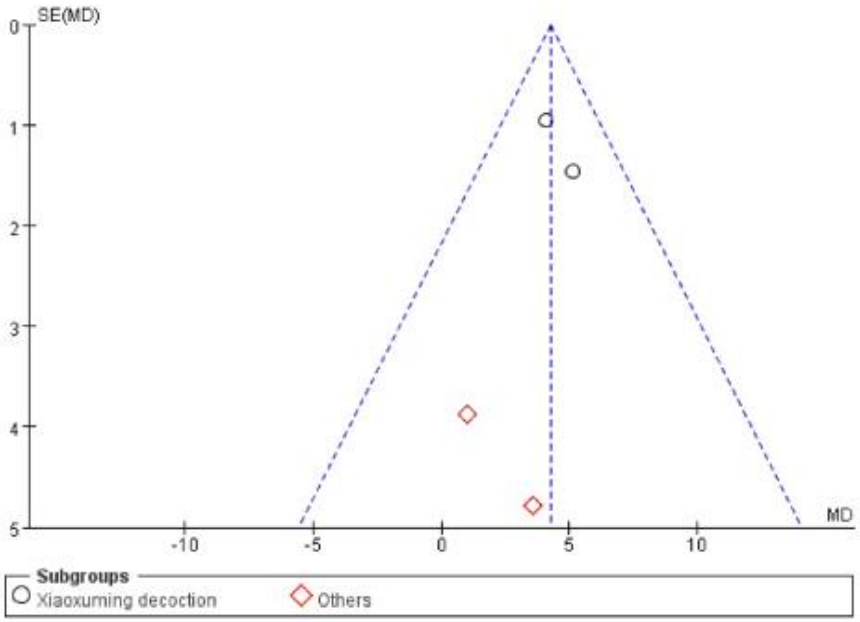
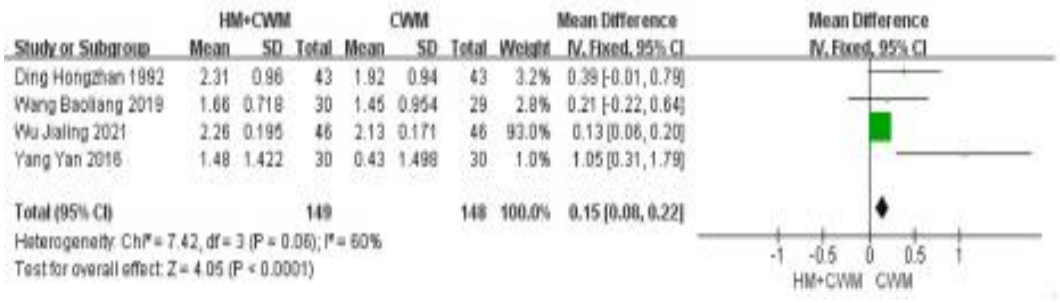


b)

Figure 5. (a) Forest plot for MBI: HM + CWM vs. CWM (b) Funnel plot for MBI: HM + CWM vs. CWM. MBI, Modified Barthel Index; HM, herbal medicine; CWM, conventional Western medicine.

MMT

Upper- and lower-limb MMT scores were analyzed in 4 studies [19, 22, 24, 28]. Both limb categories favored the treatment arm, although heterogeneity was present (upper limb: MD 0.15, 95% CI: 0.08–0.22, p < 0.0001, I^2 = 60%; lower limb: MD 0.10, 95% CI: 0.02–0.17, p = 0.01, I^2 = 59%). Funnel plots were asymmetric, again raising the possibility of publication bias **(Figure 6)**.



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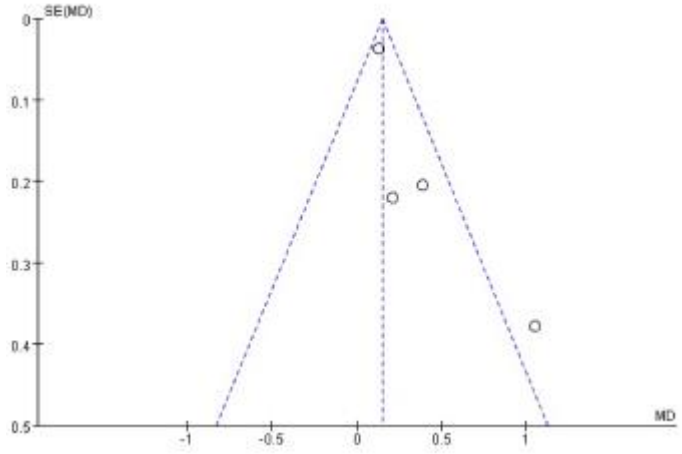

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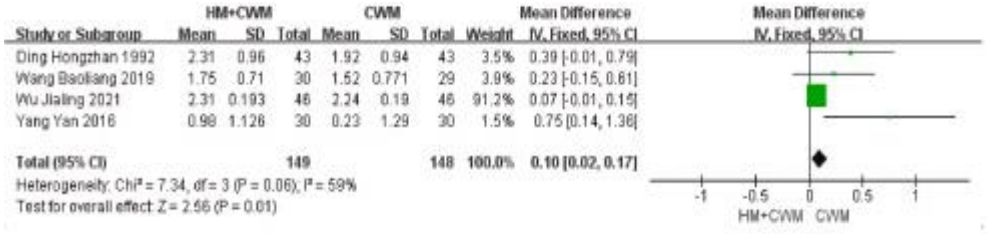

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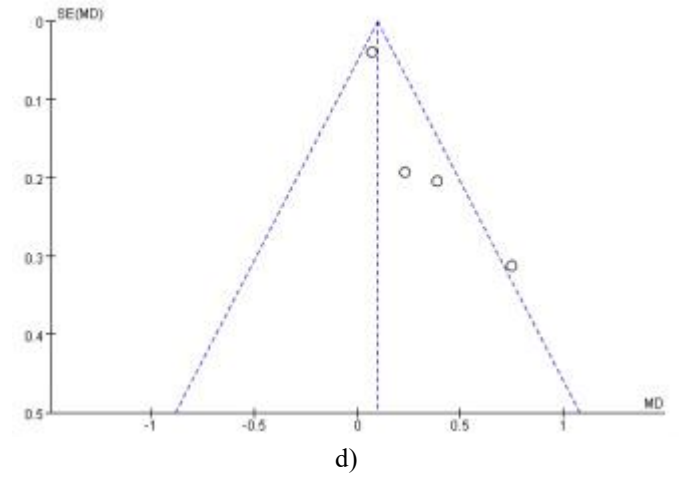

d)

Figure 6. (a) Forest plot for upper-limb MMT: HM + CWM vs. CWM. (b) Funnel plot for upper-limb MMT. (c) Forest plot for lower-limb MMT. (d) Funnel plot for lower-limb MMT
MMT, Manual Muscle Testing; HM, herbal medicine; CWM, conventional Western medicine.

The meta-analysis indicated that both TER and MBI-based ADL outcomes were substantially better in the treatment arms than in controls. With the MCID for MBI (in stroke populations) noted as 1.85 points [29], the

observed difference of over 4 points between groups in this review supports a clinically relevant benefit. MMT scores for both upper and lower extremities also improved more in participants receiving herbal interventions. To strengthen evidence for incorporating herbal therapy into GBS management, we synthesized eligible RCTs and found consistent beneficial effects.

In this sample, damp-heat and qi deficiency emerged as the most frequently identified symptom categories, and heat-clearing and qi-tonifying herbs were the most commonly used. This suggests herbal prescriptions for GBS typically target clearing damp-heat and restoring qi. GBS involves inflammatory infiltration of endoneurial vasculature, disrupting immune responses in peripheral nerves [2]. In early acute stages, this inflammatory activity corresponds to damp-heat accumulation, so treatment emphasizes eliminating damp-heat to limit immune dysregulation [20].

During early recovery, therapy focuses on addressing qi deficiency accompanied by blood stasis, supporting circulation and nerve nourishment. Later recovery addresses liver–kidney deficiency to aid muscle strength normalization [25].

Paeoniae Radix Rubra—identified as the most frequent heat-clearing herb—acts to cool the blood, alleviate discomfort through dispersing stasis, delay thrombus formation, inhibit platelet aggregation, enhance red blood cell deformability, reduce blood viscosity, and protect brain cells by increasing cerebral blood flow [19, 23]. Glycyrrhizae Radix et Rhizoma, the most prevalent qi-tonifying herb, enhances spleen qi, detoxifies by clearing heat, and harmonizes formula actions, while also providing anti-inflammatory and antioxidative immune-modulating effects.

Astragali Radix, another commonly included qi-tonifying herb, reinforces qi and Yang, restricts sweating by stabilizing the surface, detoxifies to expel pus, and supports angiogenesis and tissue repair [20, 24].

In the subgroup assessment, Xiaoxuming decoction and the Fuzheng Qingre formula appeared repeatedly across the included trials. Xiaoxuming decoction—formulated around Paeoniae Radix Rubra—demonstrated a significantly higher TER in the treatment cohorts than in the controls, and MBI-based ADL scores likewise showed statistically meaningful gains relative to the comparison groups. Previous reports indicate that Xiaoxuming decoction exerts multiple physiological actions, including vascular dilation, reduction of thrombus formation, amelioration of coagulation abnormalities, suppression of oxidative injury, attenuation of nitric-oxide–mediated cellular damage, regulation of lipid pathways, and stabilization of the neurovascular unit and blood–brain barrier [30]. Its vasorelaxant properties are attributed to interactions with several GPCR-related vasomotor targets involving 5-HT1AR, 5-HT1BR, AT1R, β2-AR, hUTR, and ETB receptors [31]. Neuroprotective benefits appear to involve increasing the Bcl-2/Bax ratio in neural tissue and blocking steps in caspase-dependent apoptosis [32]. Anti-inflammatory effects have been associated with lowering pro-inflammatory cytokine expression [33] and influencing pathways such as IL-17, TNF, and AGE–RAGE [34]. Within traditional East Asian medical theory, the formula addresses paralysis attributed to Damp-heat by clearing heat and draining dampness from the blood. Experimentally, it has shown benefit in GBS by defending the neurovascular unit through antiapoptotic, antioxidative, and anti-inflammatory mechanisms.

The Fuzheng Qingre formula, primarily centered on Astragali Radix, incorporates herbs classified as Heat-clearing and Dampness-transforming agents. Astragali Radix has been linked to angiogenic and tissue-repair effects; Glycyrrhizae Radix et Rhizoma displays both anti-inflammatory and estrogen-like actions; and Salviae Miltiorrhizae Radix, together with Paeoniae Radix Rubra, improve vascular perfusion [20, 21]. Consequently, this formula may support individuals with GBS who experience dysfunction involving immune cells and peripheral nerve structures.

This investigation, however, was subject to several constraints. First, Strychni Semen used in Ding *et al*. [28] is highly toxic; excess amounts can overstimulate respiratory and vasomotor centers in the medulla and provoke convulsions, introducing clinical safety concerns for replication. Second, consistent GBS diagnostic standards were not uniformly applied across studies. Third, although a precise diagnosis is critical when prescribing herbal treatments, many publications did not clearly define how GBS was confirmed. Fourth, only two studies [23, 28] documented adverse events, leaving the safety comparison between herbal therapy and CWM inadequately supported. Fifth, the dataset was small—10 studies in total—and methodological rigor was often insufficiently described, limiting overall reliability.

Sixth, numerous uncertainties emerged in appraising study quality, which restricted the precision of analysis and comparison.

Seventh, all trials originated from China, and previous work [35] indicates that studies from this region may

exhibit higher reported success rates, raising the possibility of cultural or linguistic publication bias. Eighth, funnel plots generated in the meta-analysis were asymmetric, suggesting potential publication bias. Although the trim-and-fill method can estimate missing effect sizes to restore symmetry [36], evaluating funnel plot asymmetry is not recommended when fewer than 10 studies are available [37, 38]. Because asymmetry may arise from various factors unrelated to publication bias [15], and because the trim-and-fill method cannot account for alternative explanations [16], meaningful bias testing was impractical in this context.

Despite these issues, the study provides clinically relevant insights. The systematic review and meta-analysis indicate that combining herbal medicine with CWM for GBS improves TER, MBI, and MMT outcomes, supporting its therapeutic potential. These findings suggest that integrative treatment may be applied more actively in practice. To reinforce this evidence base, future work should include rigorously designed, high-quality randomized controlled trials with reliable outcome measures.

Conclusion

Integrating herbal formulations with CWM for GBS produced notable improvements in motor capacity, muscle performance, rehabilitation indicators, and daily functioning, without meaningful increases in AEs. These results highlight herbal therapy as a promising adjunct for GBS care. Nonetheless, large-scale and methodologically stronger research is essential to confirm these conclusions.

Acknowledgments: This manuscript was written based on the thesis of Somin Jung for a master's degree at Kyung Hee University in 2024.

Conflict of Interest: None

Financial Support: This work was supported by a grant from the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health and Welfare, Republic of Korea [grant number RS-2023-KH142002].

Ethics Statement: This systematic review and meta-analysis was adhered to the Preferred Reporting Items for Systematic Reviews & Meta-Analysis (PRISMA) guidelines (supporting file 1).

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