

Efficacy of transabdominal magnetic field therapy on constipation severity in chronic functional constipation: A randomized controlled trial

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ABSTRACT

Objectives: To evaluate transabdominal magnetic field therapy (MFT) for constipation severity and related outcomes in adults with chronic functional constipation.

Methodology: This multicenter, three-arm randomized controlled trial was conducted at Istanbul Medipol University and Istanbul Gedik University, Türkiye, from February 2019 to April 2026. Adults meeting Rome III criteria were randomized to MFT, sham, or standard care (SC) (n=75); 60 completers formed the per-protocol analysis (20/group). MFT was administered at 25-Hz and 30-Gauss for 30 minutes, twice weekly for eight weeks. Sham replicated the procedure without active stimulation; SC received standardized constipation management education. The primary outcome was the Constipation Severity Instrument (CSI) total score. Secondary outcomes assessed bowel habits, defecation time, stool form, and constipation-related quality of life (PAC-QOL).

Results: MFT reduced CSI more than SC (mean difference in change [MD], -20.55; 95% CI, -24.97 to -16.13) and sham (MD, -14.40; 95% CI, -18.82 to -9.98; both p<0.001). MFT also improved complete spontaneous bowel movements versus SC (ratio of rate ratios [RRR], 1.57; 95% CI, 1.20-2.05) and sham (RRR, 2.39; 95% CI, 1.87-3.07), and reduced PAC-QOL versus SC (MD, -21.25; 95% CI, -24.09 to -18.41) and sham (MD, -11.60; 95% CI, -14.44 to -8.76; all p≤0.001). No adverse events were observed or reported among completers.

Conclusions: Transabdominal MFT was associated with greater short-term improvements in constipation severity, bowel function, and constipation-related quality of life than sham treatment and standard care. Future studies should establish optimal stimulation parameters and evaluate long-term effectiveness and safety.

KEYWORDS: Constipation, Gastrointestinal motility, Magnetic field therapy, Quality of life.

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INTRODUCTION

Chronic constipation is a common gastrointestinal disorder that significantly impairs quality of life and is characterized by infrequent bowel movements, straining, and hard stools.¹ It affects approximately 10-20% of the

adult population worldwide, with a higher prevalence among women and older individuals.² It is broadly classified into secondary forms related to metabolic, neurological, or structural causes, and functional forms without identifiable organic pathology.³ According to the Rome-III criteria, functional constipation is characterized by persistent difficulty with defecation, including symptoms such as straining, hard stools, incomplete evacuation, and infrequent bowel movements, in individuals who do not meet the diagnostic criteria for irritable bowel syndrome.⁴

First-line management includes conservative approaches such as physical activity, adequate fluid intake, and dietary fiber modification.⁵ In cases of persistent symptoms, non-invasive adjunctive therapies are often used due to their favorable safety profile. Among these, electrotherapy modalities-including biofeedback and neuromodulation techniques-have gained increasing attention.⁶

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Magnetic field therapy (MFT) has been proposed as a potential treatment option due to its ability to influence intestinal motility and smooth muscle activity. However, current evidence remains limited, particularly for transabdominal applications, and underlying mechanisms are not fully understood.^{6,7} This study aimed to evaluate the effects of transabdominal MFT, in addition to standard care, on constipation severity, bowel function, and quality of life in individuals with chronic functional constipation. We hypothesized that transabdominal MFT would provide greater improvement in constipation severity, bowel function and quality of life compared to other groups.

METHODOLOGY

This multicenter, three-arm randomized controlled trial was conducted between February 2019 and April 2026 at the Physiotherapy and Rehabilitation Laboratories of Istanbul Medipol University and Istanbul Gedik University, Türkiye. The study was conducted in accordance with the Declaration of Helsinki and reported according to the CONSORT statement.

The sample size was calculated using G*Power (v3.1.9.7) based on the CSI as the primary outcome. Using an effect size of $f=0.425$ derived from a previous study,⁸ an α level of 0.05, and 80% power, the minimum required sample size was 57 participants (19 per group). This number was rounded to 60 completers (20 per group); allowing for an anticipated 20% attrition rate, 75 participants were randomized.

Ethical approval: It was obtained from the Non-Interventional Clinical Research Ethics Committee on January 31, 2019 (decision no. 107; reference no. 10840098-604.01.01-3638). The trial was registered at ClinicalTrials.gov (NCT06578442). Written informed consent was obtained from all participants.

Inclusion criteria:

- Adults aged 18-68 years.
- Diagnosis of chronic functional constipation according to the Rome III criteria.
- No ongoing pharmacological or non-pharmacological treatment for constipation at enrollment and agreement not to initiate any additional treatment during the study, other than the assigned intervention.
- Ability and willingness to comply with the study procedures and intervention schedule.

Exclusion criteria:

- Severe obesity.
- Presence of irritable bowel syndrome according to the Rome III diagnostic criteria.
- Presence of an implanted electronic device or a metallic/ferromagnetic implant potentially affected by the magnetic field, including cardiac pacemakers, neurostimulators, or cochlear implants.
- Pregnancy.
- Epilepsy.
- Untreated hyperthyroidism.
- Active infection or fever.

All participants received standardized constipation management education before randomization. **Outcome**

measures: Participant characteristics, including age, sex, body mass index, education, marital and employment status, smoking, alcohol consumption, daily fluid intake, and meal frequency, were recorded at baseline. Outcomes were assessed at baseline and after the eight-week intervention.

Primary outcome:

Constipation Severity Instrument (CSI): Constipation severity was assessed using the validated Turkish CSI.^{9,10} Its 16 items comprise obstructive defecation (0-28), colonic inertia (0-29), and pain (0-16) subscales, producing a total score of 0-73; higher scores indicate greater severity. The Turkish version demonstrated high internal consistency (Cronbach's $\alpha=0.92-0.93$). Two items refer to the preceding month, whereas the remaining items assess usual symptoms without a fixed recall period. The CSI total score was the primary outcome; its subscales were secondary outcomes.

Secondary outcomes:

Bowel outcomes: Stool form was assessed using the standard pictorial Bristol Stool Scale (BSS), a validated seven-category ordinal measure in which Types 1-2 indicate hard/constipated stools and Types-III and IV indicate normal stool form.^{11,12} Weekly complete spontaneous bowel movements (CSBMs) and defecation time were recorded during the seven days preceding each assessment. A CSBM was defined as a bowel movement occurring without laxative use during the preceding 24 hours and accompanied by a sensation of complete evacuation. Defecation time was recorded in minutes per attempt; lower values indicate improvement.

Patient Assessment of Constipation Quality of Life (PAC-QOL): The Turkish PAC-QOL assesses constipation-related quality of life over the preceding two weeks.^{13,14} Its 28 items cover physical discomfort, psychosocial discomfort, worries/concerns, and satisfaction. Items are scored from 0 to 4 and were summed in this study (total range: 0-112); higher scores indicate poorer quality of life. The Turkish adaptation demonstrated high internal consistency ($\alpha=0.91$) and moderate test-retest reliability (ICC=0.68).

An increase of ≥ 1 CSBM/week and a reduction of approximately 1.0 point in the PAC-QOL mean item score-equivalent to approximately 28 points on the summed scale-have been proposed as clinically meaningful benchmarks; however, these thresholds were not pre-specified as responder criteria in the present study.^{5,15,16}

Eligible participants were enrolled by the site investigators at the respective study centers. A computer-generated simple randomization sequence with equal allocation probabilities was prepared by an independent physiotherapist who was not involved in recruitment, outcome assessment, or treatment. Randomization was neither blocked nor stratified by study center; therefore, equal final group sizes were not enforced. Allocation concealment was maintained using sequentially numbered, opaque, sealed envelopes. Following baseline assessment, the independent physiotherapist opened the next envelope in numerical order and communicated the group

assignment to the site investigators, who subsequently administered the assigned interventions. Participants in the MFT and sham groups were blinded to their group assignments. Blinding could not be applied to the standard care group because it did not receive a device-based intervention. Outcome assessors were blinded to group allocation. Of the 84 participants assessed for eligibility, 75 were randomized. Fifteen participants withdrew dur-

ing follow-up and did not complete the post-treatment assessment. Therefore, the per-protocol analysis included the 60 participants who completed the intervention and post-treatment assessment ($n=20$ per group) (Fig.1).

Treatment adherence and adverse events: Attendance at the 16 planned device sessions was recorded. All participants who completed the intervention in the MFT and sham groups attended all 16 scheduled sessions, corresponding

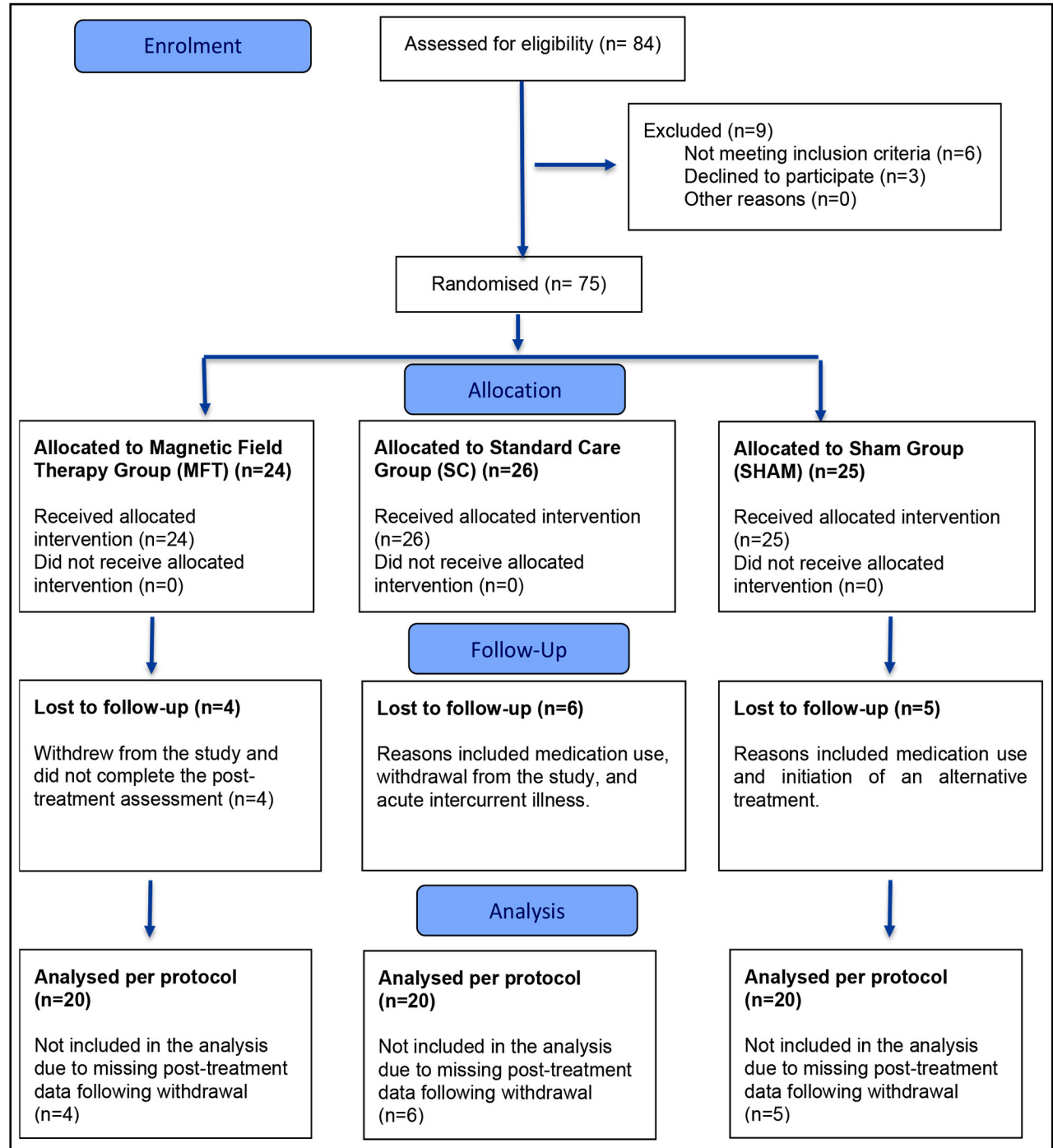


Fig.1: CONSORT 2025 Flow Diagram.

to 100% session adherence among completers. Overall, 60 of the 75 randomized participants (80.0%; 20 per group) completed the eight-week study protocol. No treatment-related adverse events were reported by participants or observed by the treating therapists, and no withdrawal was attributed to an adverse event.

Interventions: All groups received standardized constipation management education in accordance with international guidelines.^{1,3,5} This education included lifestyle modifications such as adequate dietary fiber intake (approximately 25-30 g/day), sufficient fluid consumption, regular physical activity, regulation of bowel habits (particularly encouraging defecation during periods of increased gastrocolic reflex), and adoption of an appropriate defecation posture. This approach is recommended as the first-line management for chronic constipation and should be implemented prior to pharmacological or interventional treatments.

The MFT group received transabdominal MFT at 25-Hz and 30-G (3-mT) for 30 minutes, twice weekly for eight weeks (16 sessions). Applications were performed using an ELF-984 device (Elettronica Pagani, Italy). Participants were positioned supine, and two identical oval contact applicators supplied with the device were placed directly on the skin over the right and left lower abdominal regions, lateral and slightly inferior to the umbilicus (Fig.2). The applicators operated simultaneously to provide consistent field exposure. At both centers, all sessions were administered by trained site physiotherapists according to the same standardized protocol. The sham group underwent the same positioning, applicator placement, session duration, and treatment schedule, but without active magnetic-field stimulation. The SC group received only standardized constipation-management education. Participants were not informed about the interventions administered to the

other groups. Following study completion, participants in the SC and sham groups were offered active treatment.

Statistical analysis: Analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). The per-protocol analysis included 60 participants with complete pre- and post-treatment data; missing outcomes were not imputed. Categorical data are presented as n (%), continuous data as mean $\pm$ SD, and BSS and CSBM values as median [Q1-Q3]. Baseline group differences were assessed using one-way ANOVA and chi-square or Fisher's exact tests, as appropriate. Normality and homogeneity of variance were assessed using the Shapiro-Wilk and Levene tests, respectively. Continuous intervention effects were analyzed using 3 $\times$ 2 mixed-design ANOVA. Significant group $\times$ time interactions were followed by Tukey HSD comparisons of change scores with simultaneous 95% CIs. Partial eta squared (η^2) was reported with noncentral-F 95% CIs. BSS change scores were analyzed using the Kruskal-Wallis test followed by Dunn-Holm comparisons, with epsilon squared (ϵ^2) and Cliff's delta (δ) reported alongside percentile-bootstrap 95% CIs. CSBM was analyzed using Poisson group $\times$ time regression with participant-clustered robust standard errors; Holm-adjusted contrasts were reported as ratios of rate ratios (RRRs) with 95% CIs. All tests were two-sided, with $p < 0.05$ considered statistically significant.

RESULTS

Of the 75 randomized participants, 60 completed the study and were included in the per-protocol analysis (20 per group). Demographic and clinical characteristics are presented in Table-I.

Primary outcome: Baseline CSI total scores were similar across groups. A significant group $\times$ time interaction was observed for the CSI total score ($F(2,57)=65.856$, $p<0.001$,

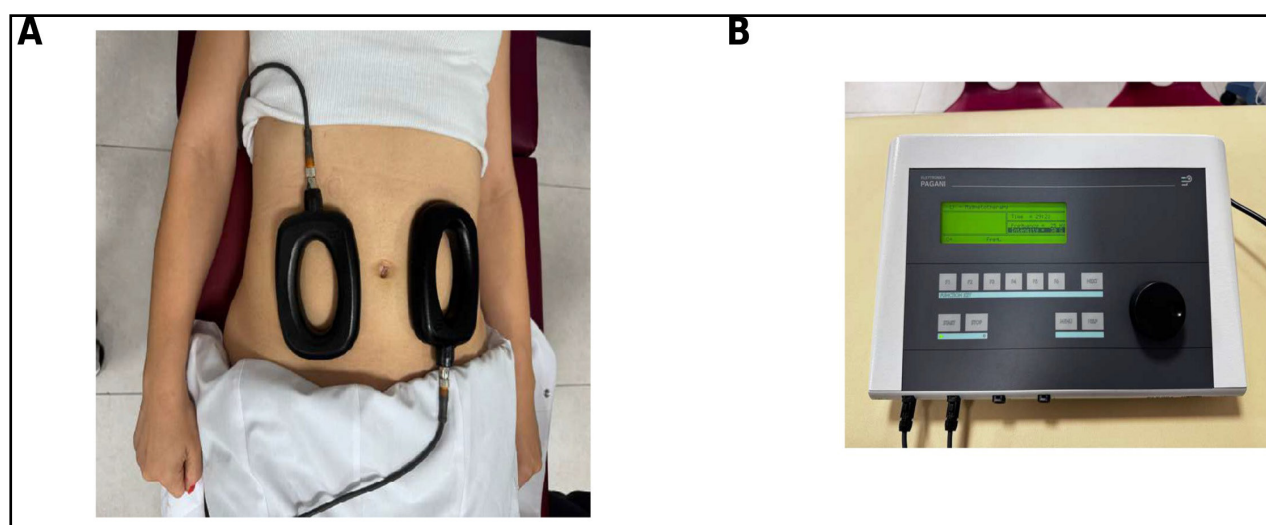


Fig.2: Transabdominal magnetic field therapy application and device.

(A) Placement of two abdominal applicators during treatment.

(B) ELF-984 magnetic field therapy device (Elettronica Pagani, Italy).

Table-I: Basic demographic and clinical characteristics.

Variables	MFT Group (n=20)	SC Group (n=20)	Sham Group (n=20)	Statistic	p
Age(years),mean±SD	28.05±13.28	26.35±10.61	27.20±9.29	F=0.115	0.891
Gender, n(%)				$\chi^2=3.239$ 0.198	
Female	15(75)	17(85)	12(60)		
Male	5(25)	3(15)	8(40)		
Body mass index(kg/m ²), mean±SD	23.70±4.02	23.74 ± 4.67	23.50 ± 4.07	F=0.018	0.982
Daily fluid intake (glasses/day)				F=0.476 0.624	
Mean±SD	6.60±1.73	6.05 ± 1.90	6.25±1.77		
Daily meal frequency, n(%)				$\chi^2=0.137$ 0.934	
Two meals/day	12(60)	11(55)	12(60)		
More than two	8(40)	9(45)	8(40)		

Note: MFT: magnetic field therapy group; SC: Standard care group; Sham: sham treatment group; SD: standard deviation; χ^2 : chi-square value. p: one-way ANOVA for continuous variables.

$\eta^2=0.698$; 95% CI, 0.548-0.773). Adjusted change-score comparisons showed greater reductions with MFT than with SC (MD, -20.55; 95% CI, -24.97 to -16.13) and sham treatment (MD, -14.40; 95% CI, -18.82 to -9.98; both $p<0.001$) (Table-II).

Secondary outcomes: Significant group $\times$ time or global effects were observed for the CSI subscales, weekly CSBM, defecation time, BSS, and PAC-QOL (all $p\leq 0.002$). Adjusted pairwise comparisons showed greater improvements with MFT than with both SC and sham treatment across all secondary outcomes (all adjusted $p\leq 0.022$) (Table-II). Participants retained in the MFT and sham groups completed all 16 scheduled sessions (100% adherence). No intervention-related adverse events were observed or reported during treatment.

DISCUSSION

Transabdominal MFT was associated with greater short-term improvements in constipation severity, bowel habits, and constipation-related quality of life in individuals with chronic functional constipation. These findings suggest that magnetic field-based neuromodulation may represent a promising complementary approach in constipation management, consistent with current evidence regarding neuromodulation for chronic functional constipation.⁶

Previous studies investigating magnetic stimulation (MS) in constipation have reported similar findings. Fawaz et al. reported improvements in constipation severity following spinal MS in adults with functional constipation.¹⁷ Yun et al. reported improved bowel function following transabdominal functional magnetic stimulation in brain-injured patients, although this neurogenic population differs from the chronic functional constipation population evaluated in the

present study.¹⁸ Wang et al. and Tsai et al. demonstrated that spinal MS increased bowel-movement frequency and improved colonic transit time in older adults with chronic constipation.¹⁹ The improvements observed in the present study, particularly in constipation severity and bowel habits, are broadly consistent with these findings.

However, most previous research has focused on sacral or spinal stimulation. Sacral MS has been shown to facilitate defecation by increasing anorectal pressures,²⁰ whereas spinal stimulation may influence colonic motility.²¹ Evidence regarding transabdominal applications in individuals with chronic functional constipation remains limited. The present study extends the existing literature by evaluating transabdominal MFT using a randomized, sham-controlled, three-arm design.

The sham-controlled design represents an important methodological strength of this study. Placebo responses are common in symptom-based conditions such as chronic constipation and may result in measurable improvements.^{22,23} The improvements observed in the sham group may reflect treatment expectancy, attention received during device sessions, repeated outcome assessment, standardized constipation-management education, natural symptom fluctuation, or regression to the mean. Nevertheless, the greater improvements observed in the MFT group support a treatment-specific contribution, although nonspecific effects cannot be completely excluded.

The mechanisms underlying MFT remain uncertain. Magnetic field-based neuromodulation may influence ion-channel activity and synaptic transmission, while gastrointestinal electroceutical and magnetoceutical approaches have been proposed to modulate neural pathways involved in gastrointestinal motility.^{21,24} However, whether transabdominal MFT directly alters

Table-II: Group $\times$ time effects and adjusted pairwise comparisons for constipation severity, bowel habits, and quality-of-life outcomes.

Variables	MFT Group (n=20)	SC Group (n=20)	Sham Group (n=20)	Group $\times$ time / global test	p	Effect size (95% CI)	Adjusted pairwise comparisons
CSI Total Score	Pre:42.15 $\pm$ 5.12 Post: 15.65 $\pm$ 2.98 Δ : -26.50 $\pm$ 5.07	Pre: 42.00 $\pm$ 6.95 Post: 36.05 $\pm$ 9.23 Δ : -5.95 $\pm$ 6.50	Pre: 41.75 $\pm$ 6.29 Post: 29.65 $\pm$ 3.51 Δ : -12.10 $\pm$ 5.78	F(2, 57) = 65.856	<.001	η^2 =0.698 [.548, .773]	Tukey HSD: MFT - SC: MD -20.55 [-24.97, -16.13], p<.001 MFT - Sham: MD -14.40 [-18.82, -9.98], p<.001 Sham - SC: MD -6.15 [-10.57, -1.73], p=.004
CSI-Obstructive Defecation	Pre:21.80 $\pm$ 2.78 Post: 7.65 $\pm$ 2.54 Δ : -14.15 $\pm$ 3.53	Pre: 21.65 $\pm$ 4.31 Post: 19.60 $\pm$ 5.54 Δ : -2.05 $\pm$ 4.55	Pre: 21.30 $\pm$ 3.97 Post: 16.35 $\pm$ 3.42 Δ : -4.95 $\pm$ 3.95	F(2,57)= 49.109	<.001	η^2 =0.633 [.460, .723]	Tukey HSD: MFT - SC: MD -12.10 [-15.17, -9.03], p<.001 MFT - Sham: MD -9.20 [-12.27, -6.13], p<.001 Sham - SC: MD -2.90 [-5.97, .17], p=.068
CSI-Colonic Inertia	Pre: 14.25 $\pm$ 3.89 Post: 6.05 $\pm$ 1.79 Δ : -8.20 $\pm$ 3.85	Pre: 14.30 $\pm$ 3.70 Post: 11.90 $\pm$ 3.89 Δ : -2.40 $\pm$ 2.37	Pre: 14.30 $\pm$ 4.39 Post: 9.75 $\pm$ 1.89 Δ : -4.55 $\pm$ 3.59	F(2,57)= 15.485	<.001	η^2 =0.352 [.147, .496]	Tukey HSD: MFT - SC: MD -5.80 [-8.34, -3.26], p<.001 MFT - Sham: MD -3.65 [-6.19, -1.11], p=.003 Sham - SC: MD -2.15 [-4.69, .39], p=.112
CSI-Pain	Pre: 6.10 $\pm$ 1.29 Post: 1.95 $\pm$ 0.60 Δ : -4.15 $\pm$ 1.27	Pre: 6.05 $\pm$ 1.19 Post: 4.55 $\pm$ 1.05 Δ : -1.50 $\pm$ 1.36	Pre: 6.15 $\pm$ 0.99 Post: 3.55 $\pm$ 0.94 Δ : -2.60 $\pm$ 1.23	F(2,57)= 21.417	<.001	η^2 =0.429 [.221, .561]	Tukey HSD: MFT - SC: MD -2.65 [-3.63, -1.67], p<.001 MFT - Sham: MD -1.55 [-2.53, -.57], p<.001 Sham - SC: MD -1.10 [-2.08, -.12], p=.024
CSBM (weekly)	Pre: 1 [1-2] Post: 4.5 [4-5.25] Δ : 3 [2-4]	Pre: 1 [1-2] Post: 3 [2-3.25] Δ : 1 [1-2]	Pre: 1 [1-2] Post: 2 [1.75-2] Δ : 0 [0-1]	Wald χ^2 (2)= 48.131	<.001	Model-specific effect estimates are reported as pairwise RRRs with 95% CIs.	Poisson-Holm: MFT / SC: RRR 1.57 [1.20, 2.05], p=.001 MFT / Sham: RRR 2.39 [1.87, 3.07], p<.001 Sham / SC: RRR 0.66 [.51, .83], p=.001
Defecation Time (min)	Pre: 16.50 $\pm$ 5.40 Post: 7.90 $\pm$ 2.67 Δ : -8.60 $\pm$ 4.13	Pre: 17.75 $\pm$ 4.44 Post: 16.00 $\pm$ 4.17 Δ : -1.75 $\pm$ 2.45	Pre: 19.75 $\pm$ 6.17 Post: 16.25 $\pm$ 4.83 Δ : -3.50 $\pm$ 4.89	F(2,57)= 16.159	<.001	η^2 =0.362 [.156, .504]	Tukey HSD: MFT - SC: MD -6.85 [-9.86, -3.84], p<.001 MFT - Sham: MD -5.10 [-8.11, -2.09], p<.001 Sham - SC: MD -1.75 [-4.76, 1.26], p=.349
Bristol Stool Scale	Pre: 2 [1-2] Post: 3 [3-3] Δ : 1 [1-2]	Pre: 2 [1-2] Post: 2 [2-3] Δ : 0 [0-1]	Pre: 2 [1.75-2] Post: 2 [2-3] Δ : 1 [0-1]	H(2)= 12.112	.002	ϵ^2 =0.177 [.030, .423]	Dunn-Holm: MFT - SC: δ 0.527 [.230, .787]; p=.003 MFT - Sham: δ 0.465 [.182, .710]; p=.022 Sham - SC: δ 0.168 [-.150, .485]; p=.433
PAC-QOL Total Score	Pre: 86.25 $\pm$ 4.89 Post: 61.55 $\pm$ 5.61 Δ : -24.70 $\pm$ 5.46	Pre: 88.65 $\pm$ 8.62 Post: 85.20 $\pm$ 8.50 Δ : -3.45 $\pm$ 1 .57	Pre: 86.90 $\pm$ 7.93 Post: 73.80 $\pm$ 8.82 Δ : -13.10 $\pm$ 3.08	F(2,57)= 162.755	<.001	η^2 =0.851 [.769, .888]	Tukey HSD: MFT - SC: MD -21.25 [-24.09, -18.41], p<.001 MFT - Sham: MD -11.60 [-14.44, -8.76], p<.001 Sham - SC: MD -9.65 [-12.49, -6.81], p<.001

Note: Data are presented as mean $\pm$ SD or median [Q1-Q3] for BSS and CSBM; Δ = post-pre. Continuous outcomes were analyzed using 3 $\times$ 2 mixed-design ANOVA with Tukey HSD comparisons of change scores; BSS using the Kruskal-Wallis test with Dunn-Holm comparisons; and CSBM using Poisson group $\times$ time regression with participant-clustered robust standard errors and Holm-adjusted RRR contrasts. CIs were simultaneous Tukey intervals for MDs, percentile-bootstrap intervals for ϵ^2 and δ , and noncentral-F intervals for η^2 . MDs and RRRs compare the first-named with the second-named group. Negative Δ indicates improvement in CSI, defecation time, and PAC-QOL; positive Δ indicates improvement in BSS and CSBM. MFT, magnetic field therapy; SC, standard care; CSI, Constipation Severity Instrument; BSS, Bristol Stool Scale; CSBM, complete spontaneous bowel movements; PAC-QOL, Patient Assessment of Constipation Quality of Life; MD, mean difference; RRR, ratio of rate ratios; η^2 , partial eta squared; ϵ^2 , epsilon squared; δ , Cliff's delta; CI, confidence interval.

enteric neural, autonomic, or smooth-muscle activity in individuals with chronic functional constipation remains unknown. Because no direct physiological measurements were obtained, the mechanisms responsible for the observed clinical improvements cannot be determined.

From a clinical perspective, quality of life is an important patient-centered outcome in constipation management. Chronic constipation can substantially impair physical comfort, psychosocial well-being, and daily functioning.²⁵ Improvements in bowel symptoms have also been associated with improvements in constipation-related quality of life.^{15,25} In the present study, the reduction in PAC-QOL scores indicates improvement in patient-reported quality of life. However, although statistically significant, the mean 24.70-point reduction in the MFT group was below the approximate 28 points exploratory benchmark corresponding to a one-point reduction in the PAC-QOL mean item score. Because this benchmark was not prespecified as a responder criterion and was derived partly from different clinical populations, the clinical meaningfulness of the observed improvement should be interpreted cautiously. The median increase of three CSBMs per week in the MFT group exceeded the exploratory benchmark of at least one additional CSBM per week at the group level. However, because this threshold was not prespecified as an individual responder criterion and no established clinically meaningful change threshold was available for the CSI, the observed statistical differences should not be interpreted as confirming individual-level clinical benefit. These findings support further investigation of transabdominal MFT as a non-invasive adjunct rather than its routine clinical use.

Strengths: The randomized, sham-controlled, multicenter design, achievement of the calculated target of 60 completers, standardized intervention protocol, and inclusion of patient-centered outcomes strengthen this study.

Limitations: Reliance on self-reported outcomes, the absence of objective physiological measurements and long-term follow-up, and the inability to estimate center- or therapist-specific effects limit interpretation. Although the 60 participants who completed the study exceeded the minimum required sample size of 57, 15 of the 75 randomized participants withdrew during follow-up. Because the analyses were restricted to participants with complete post-treatment data and missing outcomes were not imputed, attrition bias cannot be excluded, and the observed treatment effects may differ from those that would have been obtained had all randomized participants been included. Although no treatment-related adverse events were observed or reported among completers, adverse events were not assessed using a prespecified systematic monitoring instrument; therefore, conclusions regarding safety remain limited.

CONCLUSION

Transabdominal MFT was associated with greater short-term improvements in constipation severity, bowel function, and constipation-related quality of life than

sham treatment and standard care, supporting the study hypothesis. These findings suggest that transabdominal MFT may represent a promising non-invasive adjunct; however, sustained effectiveness and longer-term safety require confirmation before routine clinical use.

Recommendations: Given the heterogeneity in anatomical targets and stimulation parameters across magnetic stimulation protocols, the present 25-Hz, 30-G regimen should be considered tested rather than optimized. Future sham-controlled dose-ranging trials should determine the optimal frequency, field strength, session duration, treatment schedule, and applicator placement. They should also incorporate intention-to-treat analyses, prespecified responder criteria, systematic adverse-event monitoring, objective assessments of colonic transit and anorectal function, and longer follow-up. Larger multicenter studies should examine potential center and therapist effects and determine whether treatment responses differ across constipation phenotypes.

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Data availability statement: The data presented in this study are available on request from the corresponding author due to ethical reasons.

Clinical implications:

- Transabdominal MFT produced short-term improvements across constipation severity, weekly CSBM frequency, stool consistency, defecation time, and constipation-related quality of life, supporting its potential as a non-invasive adjunct to standard constipation management.
- The standardized 25-Hz, 30-G, eight-week protocol was feasible, achieved 100% session adherence among completers, and was not associated with any observed or reported treatment-related adverse events.
- These findings provide a clinically relevant basis for larger studies examining the durability of treatment effects, optimal stimulation parameters, and patient selection.

Conflicts of interest: None.

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GBE: Conceptualization, methodology, investigation, data collection, formal analysis, and manuscript drafting.
DKO: Conceptualization, methodology, validation, visualization, project administration, and manuscript review and editing.
BI and AA: Validation, literature search, data collection, and manuscript review and editing.
EA: Supervision, methodology, and critical review and editing of the manuscript.
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