Review Article

Swiss Ball Exercises for Constipation: Mechanistic Hypothesis, Evidence Quality Assessment, and Clinical Translation Framework

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Constipation is a prevalent gastrointestinal disorder that substantially impacts quality of life and remains inadequately managed by conventional dietary and pharmacological interventions. Evidence supports physical therapy and pelvic floor muscle training as effective adjunctive strategies for improving constipation outcomes. Swiss ball exercises are proposed as an accessible, low-cost, and engaging candidate adjunct intervention that may enhance this therapeutic landscape. This hypothesis-generating narrative review synthesizes mechanistic evidence from related clinical contexts to construct a plausible physiological rationale for Swiss ball use in constipation management. Swiss ball interventions may operate through multiple complementary pathways: enhancing pelvic floor muscle coordination and neuromuscular control critical for effective defecation; activating deep core stabilizers that provide segmental spinal and pelvic stability; reducing excessive anorectal pressure; and modulating anorectal pain through non-noxious sensory input consistent with Gate Control Theory. Although no randomized controlled trials have directly evaluated Swiss ball exercises for adult constipation management, this synthesis draws on indirect mechanistic evidence from pelvic floor dysfunction rehabilitation, core stabilization research, and pain modulation studies. Notably, a randomized clinical trial in children with dysfunctional voiding reported complete constipation symptom resolution in all constipated participants undergoing Swiss ball–enhanced pelvic floor training, supporting the plausibility of Swiss ball use as an adjunctive intervention. This review proposes that Swiss ball exercises—both dynamic functional movements and postural sitting interventions—may represent a mechanistically plausible adjunct to nutritional strategies, pharmacological management, and behavioral modifications in comprehensive constipation care paradigms. Rigorous randomized controlled trials in adult populations with functional and chronic

constipation are essential to test these hypotheses, validate efficacy, establish standardized protocols, and elucidate optimal patient selection criteria.

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Introduction

Constipation is a prevalent gastrointestinal disorder characterized by reduced bowel movement frequency and difficulties in defecation with a significant impact on an individual's quality of life. This condition can be categorized into functional constipation, chronic primary (idiopathic) constipation, and chronic secondary constipation, each with distinct underlying factors and clinical features[1][2][3]. When left untreated, it results in complications, such as hemorrhoids, rectal bleeding, and anal fissures, and serious complications, such as rectal prolapse and fecal impaction [1][4]. These complications often create additional suffering and functional impairment and generate additional healthcare visits. Given the high burden of constipation in outpatient clinical practice, its frequent coexistence with cardiometabolic risk factors and diseases (such as hypertension, coronary heart disease, and metabolic syndrome), and its documented association with chronic musculoskeletal pain such as low back and lower limb pain, practical and scalable adjunctive strategies are of particular interest to clinicians.[1][2][3][4].

Current first-line management emphasizes dietary modifications (increased fluid intake, soluble fiber supplementation), lifestyle interventions (regular physical activity, proper bowel habits), and behavioral counseling[5][6]. When these strategies prove insufficient—as they do in a substantial proportion of patients—pharmacological therapies are introduced, including osmotic laxatives (polyethylene glycol, magnesium hydroxide), stool softeners, secretagogues (lubiprostone, linaclotide), and prokinetic agents[1]. Despite the implementation of comprehensive conventional management strategies, many patients continue to experience persistent constipation symptoms and associated complications, warranting exploration of evidence-based complementary non-invasive interventions.

Physical activity is now recognized as an essential component of constipation management, with moderate to high levels of regular physical activity demonstrating significant protective effects and symptom reduction [7][8]. However, standard physical activity recommendations may not specifically address the neuromuscular dysfunction underlying pelvic floor dyssynergia and anorectal pressure dysregulation, which are recognized subtypes of constipation requiring targeted pelvic floor

physiotherapy [9][10]. Pelvic floor muscle training combined with biofeedback has demonstrated substantial efficacy in managing constipation due to pelvic floor dyssynergia, with clinical trials showing that more than 80% of patients achieve significant symptom improvement[11][12]. These interventions enhance pelvic floor muscle coordination, facilitate proper muscle relaxation during defecation, reduce excessive straining, and restore normal defecation mechanics[13].

Building upon this established foundation, Swiss ball exercises represent an innovative extension of physical therapy approaches that may provide additional synergistic benefits through enhanced neuromuscular coordination, core stability, and postural optimization. Swiss ball (also known as exercise ball or therapy ball) interventions have demonstrated therapeutic benefits across diverse clinical contexts (Table 1), including labor pain management, chronic low back pain rehabilitation, trunk stabilization in patients with core weakness, and dysfunctional voiding in children[14][15][16][17]. These clinical applications highlight the ball's unique capacity to enhance core stability through continuous neuromuscular adjustment, activate deep stabilizer muscles through its unstable surface, and promote proprioceptive awareness through dynamic feedback[18][19].

Study	*Population & Condition*	*Swiss ball vs comparator*	*Main Outcome(s)*	*Relevance for Constipation & Anorectal Pressure*
Ladi Seyedian et al. (2014)[17]	children with dysfunctional voiding ± constipation	Swiss ball + functional pelvic floor exercises + urotherapy vs. urotherapy alone	100% constipation resolution in constipated subgroup; normalization of voiding patterns; reduced pelvic floor overactivity on EMG	Direct evidence that Swiss ball–enhanced pelvic floor training can resolve constipation via improved neuromuscular coordination (model for adult dyssynergic constipation)
Scott et al. (2015)[16]	Adults with chronic low back pain	Swiss ball sitting + upper limb tasks vs. chair sitting with same tasks	Higher lumbar multifidus activation on Swiss ball across all conditions	Supports deep core stabilizer activation on an unstable surface, relevant to spinal–pelvic stability and efficient pressure transmission during defecation
Terre et al. (2025)[15]	24 RCTs, n≈2,600 laboring women	Birthing ball use vs. conventional management	Pooled pain reduction; lower epidural use; modest reduction in cesarean rate	Robust evidence that Swiss ball reduces pain via non-noxious sensory input and better pelvic positioning; supports gate-control and postural mechanisms relevant to anorectal pain in constipation
Marshall & Murphy (2006a, 2006b)[18] [19]	Healthy adults	Resistance exercises on Swiss ball vs. stable bench/floor	Higher activation of deltoid, abdominal, and trunk stabilizers on ball with similar perceived exertion	Indicates Swiss ball efficiently recruits stabilizing musculature, supporting its use to train coordinated abdominal–pelvic floor engagement in constipation management

Table 1. Swiss ball intervention evidence from related clinical contexts: relevance to constipation management.

The theoretical foundation for this narrative review rests upon established principles of neuromuscular

physiology, biomechanics, and pain modulation. This hypothesis-generating review synthesizes mechanistic evidence from related but heterogeneous clinical contexts and explicitly acknowledges that no randomized controlled trials have directly evaluated Swiss ball exercises in adults with chronic or functional constipation. Within this constraint, we hypothesize that Swiss ball interventions may enhance pelvic floor muscle coordination, activate deep core stabilizers, reduce excessive anorectal pressure, and modulate pain perception—thereby addressing multiple pathophysiological dimensions of constipation. This mechanistic perspective integrates evidence from pelvic floor dysfunction treatment, core stability rehabilitation, pain modulation theory, and the unique dysfunctional voiding study demonstrating constipation resolution, positioning Swiss ball exercises as a hypothesized low-cost, accessible, and engaging adjunct within comprehensive constipation management, based on mechanistic convergence from related clinical contexts (Figure 1).

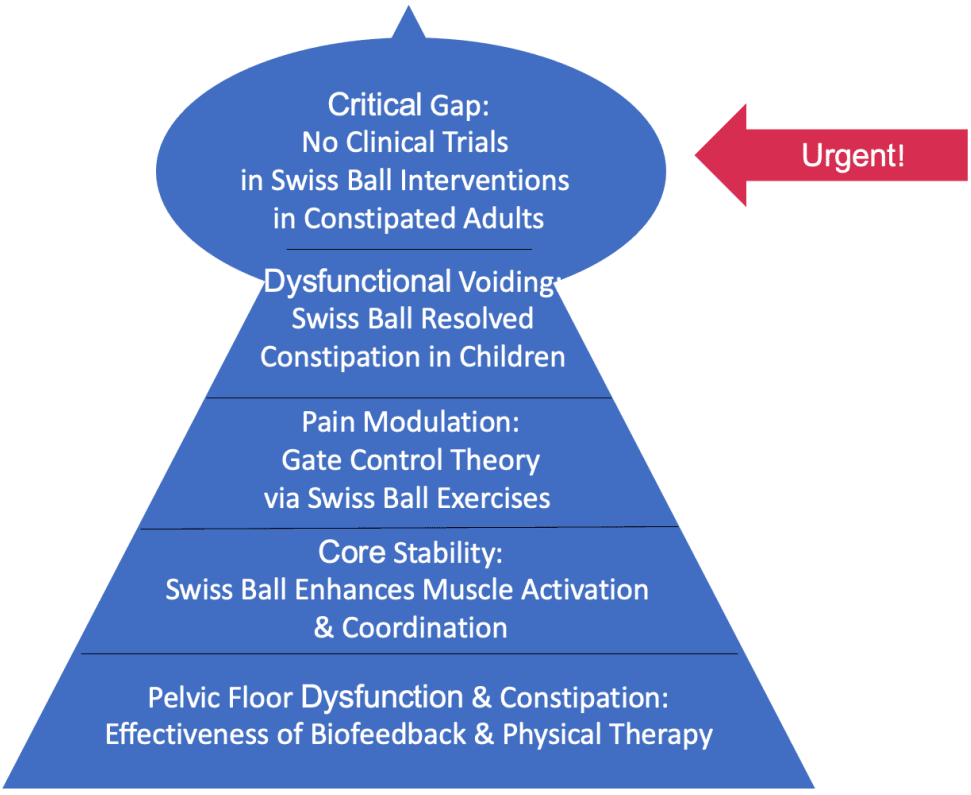

Figure 1. Proposed mechanisms by which Swiss ball exercises address constipation pathophysiology. The four pathways integrate evidence from pelvic floor rehabilitation, core stability research, postural studies, and pain modulation theory to support Swiss ball use as an adjunctive intervention.

Methods

This hypothesis-generating narrative review synthesizes evidence from multiple clinical domains to construct and test a mechanistic rationale for Swiss ball interventions in chronic and functional constipation management. A systematic literature search was conducted across PubMed, Scopus, Web of Science, and ScienceDirect databases up to November 2025, using controlled vocabulary and free-text combinations: ("Swiss ball" OR "exercise ball" OR "therapy ball" OR "birthing ball") AND ("constipation" OR "pelvic floor" OR "anorectal pressure" OR "dyssynergic defecation" OR "defecation disorder" OR "obstructed defecation" OR "hemorrhoids" OR "anal fissure").

Inclusion criteria included English-language publications reporting: (1) Swiss ball interventions or mechanistically related unstable-surface training; (2) outcomes relevant to constipation pathophysiology (pelvic floor coordination, core stability, anorectal pressure dynamics, defecation biomechanics, anorectal pain); (3) human clinical trials, observational studies, systematic reviews/meta-analyses, or biomechanical investigations. Exclusion criteria comprised animal studies, non-English publications, interventions lacking unstable-surface components, and studies without mechanistic relevance to defecation disorders or anorectal complications.

Quality assessment was applied systematically to included studies using validated tools: modified AMSTAR-2 criteria for systematic reviews and meta-analyses (high quality defined as ≥8/11 checklist items fulfilled) and the PEDro scale for randomized controlled trials (good quality defined as ≥6/10; excellent ≥8/10). Risk of bias evaluation emphasized blinding status, allocation concealment, and independent outcome assessment. For example, the Ladi-Seyedian pediatric RCT demonstrating 100% constipation resolution scored 8/10 on PEDro (blinded assessors, concealed allocation, intention-to-treat analysis), while the Terres meta-analysis of birthing ball trials scored 9/11 on AMSTAR-2.

From 1,247 initially identified records (after duplicate removal), 42 studies met inclusion criteria following title/abstract screening (n=187 excluded) and full-text review (n=112 excluded). Data synthesis prioritized physiological convergence across domains rather than quantitative meta-analysis given clinical and methodological heterogeneity. Quality scores and relevance grading for pivotal studies appear in Table 2. This transparent, pre-specified approach aligns with standards for hypothesis-generating narrative reviews that systematically synthesize preliminary evidence across related fields to identify high-priority therapeutic targets warranting direct investigation.

Study	*Design*	*Quality Score*	*Key Findings*	*Directness to Constipation*	*Key Limitation*
Ladi-Seyedian [17]	RCT (n=60 children)	PEDro 8/10	100% constipation resolution in Swiss ball + pelvic floor vs urotherapy alone; EMG normalization	High (100% resolution, direct constipation outcome + pelvic floor mechanism)	Pediatric population
Chiarioni [12]	RCT (n=100 adults)	PEDro 7/10	Biofeedback superior to laxatives (54% vs 27% response); manometry normalization	High (adult constipation benchmark; pelvic floor retraining standard)	No Swiss ball intervention
Terres [15]	Meta-analysis (24 RCTs, n=2600)	AMSTAR 9/11	Birthing ball reduces labor pain (SMD -1.8, p<0.001); lower epidural/cesarean rates	Medium (pain modulation + pelvic positioning under strain)	Labor pain context
Marshall [19]	Biomechanical (n=24 adults)	PEDro equiv 6/10	Swiss ball increases multifidus/deltoid activation 25-40% vs stable surface	Medium (core stability relevant to defecation biomechanics)	Healthy subjects
Chung [20]	RCT (n=21 chronic LBP)	PEDro 7/10	Ball stabilization increases multifidus CSA 12.4% vs control (p=0.01)	Medium (core hypertrophy relevant to straining reduction)	Low back pain patients
Rao [21]	RCT (n=54 dyssynergic)	PEDro 8/10	Biofeedback sustains 70% response at 5 years; manometry normalization	High (long-term pelvic floor retraining efficacy)	No Swiss ball
Gao [7]	Meta-analysis (14 RCTs)	AMSTAR 8/11	Exercise improves constipation (SMD 1.2, p<0.001) vs no exercise	High (establishes exercise benefit benchmark)	General exercise (not Swiss ball)

Table 2. Quality Assessment of Key Included Studies

Quality Scoring:

- *PEDro scale (0-10): Eligibility, randomization, concealed allocation, blinding (subject/therapist/assessor), groups similar, <15% dropout, ITT, between-group differences, point estimates, variability*
- *AMSTAR-2 (0-16 items): Protocol pre-specified, duplicate selection/extraction, comprehensive search, bias assessment, funding sources*
- *PEDro "equiv 6/10": Controlled biomechanical trials scored using comparable criteria*

Directness Grading:

- *High: Direct constipation outcomes or established standards (biofeedback)*
- *Medium: Mechanistic relevance (core stability, pain gating)*
- *Low: Remote physiological connection*

Results (Synthesized Evidence)

Pathophysiology and current non-pharmacological management

The pathophysiology of constipation encompasses bowel motility and colonic sensorimotor disturbances, and anorectal and pelvic floor dysfunctions[1]. Excessive anorectal pressure and straining in constipated patients may contribute to hemorrhoids and anal fissures. Hemorrhoids—engorgement of the hemorrhoidal venous plexuses—develop primarily due to chronic straining, increased intra-abdominal pressure transmission to the hemorrhoidal venous system, and repetitive mechanical trauma to the anal cushions[22][23]. Anal fissures represent longitudinal tears in the anoderm below the dentate line, most commonly precipitated by trauma from passing large or hard stools characteristic of constipation. The pathophysiology involves elevated internal anal sphincter tone, which impairs local blood perfusion and perpetuates a cycle of tissue ischemia, delayed healing, and pain-induced muscle spasm. This pain-spasm cycle maintains the fissure's chronicity and substantially increases the symptom burden, often prompting patients to avoid defecation and exacerbating constipation severity—creating a clinically problematic feedback loop[24].

The neuromuscular basis of effective defecation requires precise coordination of multiple muscle groups and pressure systems. During normal defecation, the sequence involves: (1) voluntary and reflex inhibition of the internal anal sphincter, (2) coordinated relaxation of the pelvic floor muscles (particularly the puborectalis component of the levator ani), allowing straightening of the anorectal angle, (3) generation of adequate intra-abdominal pressure through contraction of the abdominal wall and diaphragm, and (4) propulsive colonic/rectal contractions[25][26]. Pelvic floor dyssynergia disrupts this coordinated sequence through paradoxical contraction of the pelvic floor during defecation attempts, preventing the necessary anorectal angle straightening and creating functional obstruction[10].

Current clinical practice guidelines from the American Gastroenterological Association, American College of Gastroenterology, and World Gastroenterology Organization recommend a stepwise approach initiating with dietary modifications and behavioral counseling[5][6][25]. Increased dietary fiber intake—either through whole grains, vegetables, and fruits or through soluble fiber supplements (psyllium, methylcellulose)—increases stool bulk and frequency while improving consistency to facilitate evacuation[25][27]. Adequate fluid intake (typically 6–8 glasses of water daily) prevents stool dehydration and further hardening[5]. Regular physical activity, defined as moderate-intensity aerobic exercise for at least 150 minutes weekly, has demonstrated protective effects against constipation development and can improve existing constipation symptoms[7][8]. Behavioral modifications—including establishing regular toilet habits, allowing adequate time for defecation without rushing or straining, and avoiding prolonged toilet sitting—represent critical components of conservative management[5][25].

Pelvic floor physiotherapy and biofeedback

A significant subtype of constipation—pelvic floor dyssynergia—involves paradoxical pelvic floor muscle contraction during defecation attempts, creating functional obstruction and incomplete evacuation. While standard pelvic floor muscle strengthening exercises focus on muscle contraction, dyssynergic constipation specifically requires enhanced muscle coordination and relaxation capacity, often combined with biofeedback training[11][13]. Pelvic floor physiotherapy has emerged as an evidence-based, highly effective intervention specifically for this subtype of constipation [11][12][13][28]. Biofeedback-assisted pelvic floor muscle training teaches patients to voluntarily relax pelvic floor muscles during defecation attempts, correcting the paradoxical muscle activation characteristic of dyssynergia[9]. Randomized controlled trials demonstrate that combined biofeedback plus pelvic floor exercises produce superior outcomes compared to laxatives alone, with more than 80% of dyssynergic patients achieving symptom

improvement[11][12]. Remarkably, biofeedback combined with pelvic floor training has also demonstrated benefit in patients with slow transit constipation, suggesting mechanisms beyond dyssynergia correction[29][30]. Long-term efficacy data indicate sustained symptomatic improvement maintained for years following structured pelvic floor training[9][12].

Swiss ball exercises may enhance pelvic floor neuromuscular coordination through proprioceptive feedback training and dynamic movement patterns that promote coordinated pelvic floor relaxation during functional activities[17][18][19][31]. The unstable surface of the Swiss ball requires continuous muscular adjustments that enhance body awareness and motor control. Dynamic Swiss ball exercises involving pelvic tilts, bridging movements, and coordinated breathing promote conscious pelvic floor relaxation patterns—precisely the neuromuscular control needed for effective defecation[18][19]. The engaging nature of Swiss ball exercises may also improve patient adherence compared with conventional pelvic floor training alone[17].

The randomized controlled trial by Ladi Seyedian and colleagues provides direct evidence that Swiss ball-enhanced pelvic floor training can resolve constipation symptoms[17]. In 60 children with dysfunctional voiding (a functional elimination disorder pathophysiologically similar to pelvic floor dyssynergia), combined Swiss ball exercises with pelvic floor training versus standard behavioral urotherapy alone were compared. Notably, all 21 children in the Swiss ball intervention group who presented with concurrent constipation experienced complete symptom resolution, whereas only partial improvement occurred with standard urotherapy alone[17]. This evidence demonstrates that enhanced pelvic floor coordination through Swiss ball training translates directly to constipation symptom improvement.

Effective defecation requires coordinated activation of core muscles (abdominal and deep spinal stabilizers) working in conjunction with pelvic floor muscles to generate appropriate intra-abdominal pressure and optimize pelvic positioning[26][32]. Core muscle weakness and poor neuromuscular coordination frequently co-occur with constipation, particularly in sedentary individuals[33][34][35]. Standard dietary and pharmacological constipation management often overlooks the neuromuscular component, which may explain incomplete symptom resolution in some patients.

Swiss ball interventions and pelvic floor coordination

Swiss ball exercises enhance core muscle activation and neuromuscular control through the proprioceptive demands of maintaining stability on an unstable surface[16][18][19]. Multiple biomechanical studies demonstrate that Swiss ball exercises significantly increase activation of core stabilizing muscles compared with conventional exercise on stable surfaces[16][18][20]. Importantly, longitudinal studies show that Swiss ball training produces structural improvements in deep core muscles over 8 weeks[20][36], suggesting sustained neuromuscular adaptations that may benefit defecation mechanics and reduce excessive straining[20][37].

Core stability, low back pain, and constipation

The connection between constipation and chronic low back pain is clinically significant, as both conditions involve impaired core stability[33][35]. Randomized controlled trials in patients with low back pain demonstrate that Swiss ball-based core training produces superior outcomes compared with conventional exercise, with significant improvements in muscle function, pain reduction, and functional capacity[20][36][37][38]. These neuromuscular improvements are directly relevant to constipation management, where optimal core-pelvic floor coordination is essential for effective, non-straining bowel movements. Enhanced core stability may reduce the excessive straining efforts that precipitate anorectal complications such as hemorrhoids and anal fissures[20][37].

Posture, sitting patterns, and anorectal pressure

Chronic constipation is significantly influenced by straining behavior and sitting patterns. Excessive anorectal pressure during defecation directly contributes to hemorrhoid development, anal fissure formation, and rectal complications. Postural factors and sitting position substantially influence anorectal pressure distribution and straining intensity[22]. Swiss ball sitting as a postural intervention may distribute pressure more evenly across the pelvic region compared with rigid chair sitting, theoretically reducing peak anorectal pressures during prolonged sitting. The dynamic nature of Swiss ball sitting—requiring continuous subtle postural adjustments—may prevent the static pressure concentration that characterizes prolonged rigid chair sitting. Additionally, Swiss ball sitting naturally encourages optimal hip and pelvic positioning, potentially optimizing the biomechanical efficiency of defecation and reducing unnecessary straining.

While direct constipation studies are lacking, evidence from obstetric settings provides relevant mechanistic support. Multiple randomized controlled trials demonstrate that Swiss ball use during labor significantly reduces straining effort and improves pelvic floor positioning efficiency during forceful physical exertion[39][40]. Women using Swiss ball exercises showed reduced straining intensity and more efficient pelvic floor positioning[40], mechanisms directly analogous to the reduced straining desired in constipation management. This evidence suggests that Swiss ball-promoted postural optimization may translate to benefits in reducing unnecessary anorectal pressure and straining in constipated populations.

Pain modulation and gate control mechanisms

Anorectal pain associated with hemorrhoids, anal fissures, and excessive straining represents a significant clinical concern that often perpetuates constipation through pain-avoidance behaviors[22]. Reducing pain-associated avoidance is an important component of comprehensive constipation management.

Swiss ball exercises may modulate anorectal pain through non-noxious sensory feedback mechanisms (proprioception and tactile stimulation) that can inhibit pain signal transmission at the spinal cord level —a phenomenon supported by the Gate Control Theory of pain[41][42][43]. Additionally, improved pelvic floor relaxation and reduced straining directly decrease muscular pain and pressure-related discomfort[41]. In clinical practice, patients using Swiss ball-assisted pelvic floor training frequently report reduced anorectal discomfort during and after sessions[17]. Swiss ball use in labor represents one of the most extensively researched pain management applications. Systematic reviews and meta-analyses consistently demonstrate that Swiss ball exercises during labor reduce pain intensity by 1.5–2.0 points on a 10-point visual analog scale, reduce analgesic requirements, and improve patient satisfaction[15][39]. These pain-reducing effects are attributed to proprioceptive feedback, postural optimization, and psychological empowerment from active participation in symptom management[14][39]. These same mechanisms are theoretically applicable to anorectal pain management in constipated patients, suggesting that Swiss ball training may reduce the pain-associated symptom burden and improve treatment compliance.

Discussion

The synthesized evidence suggests that Swiss ball interventions address multiple pathophysiological dimensions of constipation through complementary mechanisms: enhanced pelvic floor-abdominal muscle coordination for effective, coordinated defecation; improved core stability and neuromuscular control, reducing excessive straining; optimized postural positioning, reducing anorectal pressure peaks; and pain modulation, reducing symptom-associated avoidance behaviors[9][10][11][12][16][17][18][19][39][40][42][43]. These mechanisms converge to support Swiss ball exercises as a hypothesis-generating, multifactorial neuromuscular strategy targeting key physiological deficits that are often inadequately addressed by diet and pharmacotherapy alone.

At the same time, it is critical to emphasize that direct evidence for Swiss ball use in adult constipation is currently lacking. No randomized controlled trials have evaluated Swiss ball–based interventions in adults with chronic or functional constipation, and the central mechanistic claims rely on extrapolation from heterogeneous but physiologically related contexts. The most directly relevant data come from a randomized clinical trial in children with dysfunctional voiding [17], in which all constipated participants in the Swiss ball–enhanced pelvic floor training arm experienced complete symptom resolution, and from biofeedback trials in adult dyssynergic defecation [9] showing robust improvements in anorectal manometry and symptom scores with targeted pelvic floor retraining. This pattern supports the plausibility—but not yet the proven efficacy—of Swiss ball exercises as an adjunctive neuromuscular intervention in constipation.

Direct evidence gaps

Several high-quality studies inform the broader neuromuscular and anorectal context without directly involving the Swiss ball. Randomized controlled trials of biofeedback therapy in dyssynergic defecation have demonstrated sustained symptom improvement and normalization of defecatory patterns on anorectal manometry, establishing pelvic floor retraining as an effective standard of care and providing mechanistic benchmarks for neuromuscular interventions. Trials in functional constipation with paradoxical puborectalis contraction highlight the importance of correcting defecatory dyssynergia to improve colonic transit and evacuatory function, again without the Swiss ball but with clear manometric endpoints. In parallel, core stabilization and Swiss ball–based low back pain programs show increased activation and structural adaptation of deep stabilizers such as the multifidus muscle[16][20][36][37], while

birthing ball trials in obstetrics demonstrate reduced straining and improved pelvic positioning under high intra-abdominal pressure conditions. These lines of evidence collectively support the mechanistic rationale that neuromuscular training on unstable surfaces can meaningfully influence pelvic and anorectal function, but they also underline the current evidence gap regarding direct adult constipation trials with Swiss ball protocols.

Research priorities

In light of this balance between promising mechanistic signals and limited direct evidence, several research priorities emerge:

1. Randomized controlled trials in adult constipation: No published randomized controlled trials directly examine Swiss ball exercises versus control (or head-to-head comparisons of Swiss ball exercise versus conventional biofeedback-assisted pelvic floor training, or versus general physical activity) in adult patients with chronic constipation, functional constipation, or pelvic floor dyssynergia[9][10][11][12][16][17][18][19]. High-priority trials should recruit adults with well-characterized constipation phenotypes, randomize to combined Swiss ball exercises plus standard care versus standard care alone, maintain treatment for 8–12 weeks, and measure both subjective outcomes (bowel movement frequency, straining, pain, quality of life) and objective outcomes (anorectal manometry parameters quantifying basal pressure, squeeze pressures, and during-straining profiles; electromyographic measures of pelvic floor muscle relaxation and paradoxical contraction resolution; and, where feasible, functional or dynamic magnetic resonance imaging of anorectal angle and colonic transit)[25][29][44].
2. Optimal dosing parameters: While current evidence from core stabilization and rehabilitation contexts suggests that 2–4 sessions weekly for approximately 8 weeks can produce neuromuscular adaptation[16][20][36][37], no studies have systematically compared different Swiss ball training frequencies, durations, or intensities in constipated populations. Comparative trials examining dose–response relationships would optimize clinical protocols, balance efficacy with feasibility, and inform adherence strategies.
3. Patient stratification and predictors of response: Identification of clinical, demographic, and biomechanical characteristics predicting a robust response to Swiss ball interventions would enable better patient selection and expectation-setting. Particular interest lies in differentiating responses across constipation subtypes (functional vs. chronic idiopathic vs. secondary; dyssynergic vs. slow

transit vs. mixed patterns) and comorbidities such as chronic low back pain or pelvic floor hypertonicity, given the shared core stability and neuromuscular components[10][22][34]. Incorporating baseline manometry, EMG patterns, and core muscle function into trial design could help define responder phenotypes and guide future personalized protocols.

Clinical Translation Framework (Hypothesis-Generating)

Based on the mechanistic synthesis and indirect evidence, a preliminary clinical framework can be proposed for future trials rather than immediate routine practice.

Patient selection

1. Adults with Rome IV chronic or functional constipation managed in primary care, internal medicine, or gastroenterology settings, particularly those with evidence of a pelvic floor contribution (dyssynergic or mixed patterns on anorectal manometry/electromyography).
2. Sedentary individuals or those with poor core stability.
3. Patients with persistent symptoms despite optimized dietary, lifestyle, and pharmacological management, and—optionally in a second-line scenario—those with an incomplete response to biofeedback therapy.

Intervention protocol (hypothesized)

1. Frequency: 2–3 sessions per week for 8 weeks, consistent with core stabilization trials.
2. Session duration: 20–30 minutes.
3. Components (example protocol):
    1. Pelvic tilts on Swiss ball: 3 sets × 10 repetitions
    2. Bridging with feet or shoulders on ball: 3 sets × 10 repetitions
    3. Dynamic sitting on Swiss ball during work/study: ~20 minutes/day focusing on upright posture and gentle pelvic movements
    4. Progression: Gradual increase in range of motion and instability based on tolerance.

Outcome measures for trials

1. Primary clinical outcomes: Patient Assessment of Constipation Symptoms (PAC-SYM) score. Bowel movement frequency and degree of straining (e.g., visual analog scale).

2. Objective physiological outcomes: Anorectal manometry (basal, squeeze, and during-straining pressures; rectoanal inhibitory reflex; defecation index). Surface or intramuscular EMG indices of pelvic floor relaxation during simulated defecation.

Safety and feasibility considerations

1. Contraindications: Acute rectal prolapse, unstable cardiovascular status, severe balance impairment, BMI > 35 kg/m^2 (ball size and fall risk), uncontrolled severe orthopedic conditions.
2. Recommended: Supervised initiation by a physiotherapist or trained clinician, especially in older adults or those with comorbidities.
3. Monitoring: Falls, musculoskeletal strain, exacerbation of anorectal symptoms, adherence, and patient comfort.

Testable Hypotheses for Future Trials

1. H1 (Pelvic floor relaxation): Swiss ball–based neuromuscular training improves pelvic floor relaxation during defecation, as evidenced by a significant increase in the EMG relaxation index and normalization of dyssynergic patterns on anorectal manometry.
2. H2 (Straining and pressure): Swiss ball–based training reduces excessive straining and anorectal pressure during attempted defecation, demonstrated by a ≥20% reduction in straining pressure and an improvement in the defecation index on manometry compared with standard care alone.
3. H3 (Symptom burden and complications): Swiss ball–based adjunctive therapy leads to clinically meaningful improvements in PAC-SYM scores and reductions in anorectal pain/complication burden (hemorrhoids, fissures) compared with standard care alone.

Conclusions

Constipation remains a prevalent, multifaceted gastrointestinal disorder with a substantial impact on quality of life that frequently proves inadequately responsive to conventional dietary and pharmacological management. While physical activity and pelvic floor physiotherapy represent established evidence-based interventions, innovative approaches targeting multiple pathophysiological mechanisms simultaneously may enhance therapeutic efficacy and patient outcomes.

This narrative review synthesizes mechanistic evidence from pelvic floor dysfunction rehabilitation, dysfunctional voiding management, chronic low back pain treatment, pain modulation theory, and

obstetric applications to construct a compelling, evidence-informed hypothesis that Swiss ball exercises may offer clinicians an accessible, mechanistically plausible, low-cost neuromuscular adjunct intervention within established dietary and pharmacological strategies, particularly in settings where specialized pelvic floor services are limited. The theoretical foundation encompasses four complementary mechanistic pathways: (1) enhanced pelvic floor muscle neuromuscular coordination and dyssynergia correction, (2) activation of core stabilizers and improved neuromuscular control for optimal defecation biomechanics, (3) optimization of anorectal pressure distribution through postural modification and dynamic sitting practices, and (4) pain modulation through reduction of anorectal pain perception.

A particularly compelling application emerges from positioning Swiss ball exercises as a postural intervention during daily activities—namely, Swiss ball sitting as an alternative to conventional rigid chair sitting during work and study periods. This continuous, low-level Swiss ball engagement may provide dual benefits: enhanced core-pelvic floor proprioceptive awareness and neuromuscular coordination throughout the day, combined with more physiologic pressure distribution across the pelvic region. By promoting upright posture, dynamic sitting adjustments, and optimal hip-pelvic positioning, Swiss ball sitting may reduce excessive anorectal pressure concentration and venous stasis associated with prolonged rigid chair sitting—factors contributing to hemorrhoid development and anal fissure exacerbation. Critically, Swiss ball sitting integrates these benefits directly into the nutritional management context: while dietary fiber and fluid intake provide the physiological substrate (increased stool bulk and colonic motility), Swiss ball sitting simultaneously optimizes the neuromuscular execution (coordinated pelvic floor-abdominal function and reduced straining) required for effective, healthy bowel function. This integration addresses both nutritional and neuromuscular dimensions of constipation pathophysiology, representing a whole-systems approach aligned with contemporary clinical nutrition practice models that combine multiple therapeutic modalities.

Future research should prioritize rigorous clinical trials elucidating Swiss ball exercise efficacy, mechanistic investigations confirming the proposed pathophysiological pathways, comparative effectiveness studies guiding clinical decision-making, and integration with other evidence-based constipation management approaches. Such investigations promise to advance the therapeutic landscape for this highly prevalent and frequently treatment-refractory disorder, offering patients accessible, engaging, and potentially cost-effective adjunctive options for improving bowel function, reducing anorectal complications, and enhancing quality of life.

Statements and Declarations

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Potential Competing Interests

The author has no competing interests to declare that are relevant to the content of this article.

Ethics

Not applicable.

Consent to participate

Not applicable.

Data Availability

Not applicable (this manuscript does not report data generation or analysis).

Use of Generative AI

Not applicable.

Authors' contributions

The author conceived the idea for the article, conducted the literature review, and drafted and critically revised the entire manuscript. The author approved the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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