Exploration of Musculoskeletal Diseases

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Horticultural therapy for the management of fibromyalgia: a narrative review

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Academic Editor: Jozélio Freire de Carvalho, Federal University of Bahia, Brazil
Received: June 10, 2026 **Accepted:** June 28, 2026 **Published:** July 28, 2026

Cite this article: Ben Shimol J. Horticultural therapy for the management of fibromyalgia: a narrative review. Explor Musculoskeletal Dis. 2026;4:1007131. https://doi.org/10.37349/emd.2026.1007131

Abstract

Fibromyalgia (FM) is a chronic nociplastic pain syndrome characterized by widespread musculoskeletal pain, fatigue, sleep disturbance, cognitive dysfunction, and impaired quality of life. Current management supports a multidisciplinary approach. Horticultural therapy (HT), a structured therapeutic intervention that involves gardening-related activities and interaction with natural environments to achieve specific therapeutic goals, has emerged as a potential adjunctive therapeutic modality. This narrative review summarizes the available evidence related to HT and nature-based interventions in FM. Evidence specific to syndromes of chronic pain has demonstrated the efficacy of HT in increasing pain threshold. Clinical data evaluating patients with FM have shown significant improvements in validated measures of the following: global physical and mental health; depression and anxiety; insomnia; affect, mood state, friendliness, and mindfulness; kinesiophobia and physical activity; cognitive emotional regulation and coping; perceived competence, dominance and self-efficacy; and state of arousal. Proposed mechanisms include stress reduction, sensory stimulation, increased physical activity, autonomic regulation, neurochemical adaptation, and neuroendocrine-immune modulation. The current evidence base is limited by small sample sizes, heterogeneous interventions, limited follow-up, and a scarcity of adequately powered randomized controlled trials (RCTs). Although HT appears safe and may represent a useful adjunct within multidisciplinary FM management, additional high-quality studies are required before definitive conclusions regarding efficacy can be drawn.

Keywords

fibromyalgia, chronic pain, horticultural therapy, forest therapy

Introduction

Fibromyalgia (FM) is a chronic multifactorial nociplastic pain syndrome characterized by widespread musculoskeletal pain accompanied by fatigue, sleep disturbance, cognitive dysfunction, and multifaceted

somatic symptoms. The pathophysiology remains incompletely understood, partly due to the complexity of the underlying, intertwined neuroendocrine-immune pathways. However, substantial evidence indicates that FM arises from complex interactions among central pain processing abnormalities, altered nociceptive signaling, autonomic dysfunction, neuroimmune mechanisms, psychosocial factors, and environmental stressors. Consequently, dysregulated levels of circulating neurotransmitters (NT), hormones, and cytokines precipitate central sensitization and a state of chronic autonomic arousal. As a result, FM is increasingly recognized as a disorder of altered pain regulation affecting multiple domains of physical and psychological health [1, 2].

There are several classes of medications with FDA approval for the treatment of FM. Multiple studies have demonstrated their ability to improve measures of pain, depression, and sleep architecture [3]. However, in many individuals with FM, clinical efficacy in relieving symptoms is limited, and side effects are frequent [4]. Current international recommendations emphasize a multidisciplinary treatment strategy combining patient education, regular aerobic and strengthening exercise, cognitive-behavioral interventions, supplemented by selected pharmacologic therapies when appropriate. These non-pharmacologic therapies are considered a cornerstone of FM management rather than adjunctive therapies to be utilized only when medications fail [5].

One potential modality which may be integrated into multidisciplinary FM care is horticultural therapy (HT). While therapeutic benefits of incorporating HT are well-recognized, relatively little clinical research has specifically examined the role of HT in the treatment of FM. Therefore, this narrative review aims to synthesize the published scientific evidence relevant to this topic.

Methodology and study selection

A narrative review was conducted using PubMed. Searches were performed through 2025 using combinations of the terms FM, chronic pain, HT forest therapy, forest bathing, agritherapy, farm therapy, green care, care farming, nature-based therapy, and nature-based mindfulness. Reviews, clinical trials, observational studies, and relevant guidelines published in English were considered. Priority was given to recent studies specifically involving FM. Reference lists of relevant publications were also screened. Because this was a narrative review, a formal PRISMA process was not performed. Study selection and interpretation were conducted by the author and are therefore subject to selection bias. The review is intended to provide a focused overview rather than an exhaustive synthesis of all available literature.

Fibromyalgia: The scope of the problem

Prevalence and epidemiology

FM is widespread, with a worldwide prevalence ranging between 2% and 8% depending on the region. While there is some discrepancy in the literature, FM predominates among women. It tends to peak in people aged between 50 and 60 years of age [6].

The worldwide prevalence of FM increased substantially following the COVID-19 pandemic and continues to rise [6]. Part of the rising prevalence is related to increased awareness of a syndrome that is not easily diagnosed by an objective diagnostic test. Moreover, updated diagnostic criteria from the American College of Rheumatology have made it easier for general practitioners to confirm a diagnosis [7]. Other contributing factors are likely related to heightened psychological stress and technological shifts that both promote social isolation and have elevated rates of unemployment.

Associated morbidity

FM imposes a tremendous socioeconomic burden worldwide, partially a result of the high frequency of comorbid mental illness [4]. Reduced performance both in the work and household is well-documented. Per one study, an average of more than 5 days of work were lost over three months, with household productivity reduced by days over the same period of time [8]. Moreover, FM has resulted in increased

healthcare utilization and increased disability claims. Accordingly, a systematic review published in 2022 analyzing data from 10 different countries estimated direct annual costs that range from $1,250 to $35,920 per patient [9].

Current management paradigms of FM

Management of FM relies on a multidisciplinary approach that combines pharmacologic and non-pharmacologic interventions. International guidelines consistently recommend patient education, regular exercise, and psychological therapies as important components of treatment, with medications serving primarily as adjunctive therapies in selected patients. Non-pharmacologic interventions such as aerobic exercise, resistance training, cognitive behavioral therapy (CBT), mindfulness-based approaches, and self-management strategies therefore represent established components of standard FM care rather than complementary or alternative therapies [10].

A majority of patients with FM rely on the use of integrative medicine in the management of their symptoms, with an annual cost per person for out-of-pocket alternative therapies among patients with FM reaching close to $900 per a study published in 2015 [11]. The evidence for individual forms of integrative medicine is wide-ranging, and the evidence remains mixed. Little to no randomized controlled trials (RCTs) have been performed to systematically evaluate their benefits [12].

A review of the published literature found that mind-body therapies were beneficial without evidence of a sustained effect. Analogously, multiple physiotherapy modalities, from aquatic and aerobic exercise to manual therapy, offer therapeutic value, though conclusions are constrained by a shortage of rigorous clinical trials. Likewise, CBT has been proven helpful mostly in the short-term, and despite positive findings connected to vitamin and supplement use in FM, the supporting research is mostly of poor quality [13]. Within this framework, interest in nature-based interventions has gained considerable traction.

HT

Definition and framework

HT is a structured therapeutic intervention that uses engagement with plants and natural environments to achieve designated health-related goals. Activities include gardening, cultivation, flower arranging, guided interaction within natural settings, and nature-oriented mindfulness practices. Interventions are typically led by trained horticultural therapists or multidisciplinary teams that may include occupational therapists, psychologists, and rehabilitation specialists [14]. Underlying therapeutic mechanisms are primarily grounded in neuroendocrine stress regulation and biopsychosocial behavioral interventions [15].

Historical evolution

Stretching back to ancient times, records indicate that Hippocrates promoted the healing power of nature. Likewise, medieval monasteries integrated farming into care for the sick. In the 1800s, farming was integrated into hospitals and asylums treating mental health patients. During the early 1900s, agricultural work was more systematically woven into the therapeutic programs offered in hospitals and sanatoria. Especially with the onset of World War, horticulture was recognized as a crucial element in the treatment of patients with physical or mental problems [16].

The first book describing HT was published in 1961. Subsequently, the granting of awards and the founding of a formal association for HT-affiliated work crystallized its place within the field of medical treatment. Over the next couple of decades, concepts of green care and care farming gained increased traction as a therapeutic modality for a wide range of conditions, including for patients with physical disabilities and histories of substance abuse. In parallel, increased research related to the field ushered in a large rise in the creation of care farms in many parts of the world around the turn of the 21st century [17].

Role in the treatment of neuropsychiatric and geriatric conditions

To date, clinicians have largely focused on the use of HT in the management of psychiatric disorders and conditions of cognitive impairment. Recent evidence shows that integrating structured HT into the rehabilitation of patients with schizophrenia significantly enhances personal competence, mental well-being and participation in daily activity [18]. Others have illustrated the efficacy of HT in reducing levels of anxiety in diverse populations [19]. HT also has been shown to modulate stress, improve quality of life and enhance indices related to post-traumatic stress disorder (PTSD) in a group of veterans [20].

Multiple studies have also looked at the benefits of including such therapies in the treatment of elderly people. One group showed that HT resulted in weight loss, lower levels of stress-related hormones, increased flexibility, improved diet, and enhanced social interactions among seniors [21]. Other papers have described enhanced physical function, quality of life, and mood in older adults. Similarly, horticulture has been demonstrated to improve measures related to cognitive function and agitation among the aged [22].

Applications in the management of chronic pain

Despite a growing body of evidence exploring the psychological benefits of HT, relatively little has been written about its role in reducing pain. Nonetheless, one study found that the addition of HT to a program of pain management improved physical health and the ability to cope with chronic pain [23]. Moreover, a palliative care study demonstrated improved indices of pain in hospice patients who engaged in a long-term horticulture intervention [24].

Another group found that in patients with chronic low back pain, an HT intervention improved measures of spine flexion and the perception of pain [25]. Furthermore, a brief course of HT improved several parameters of wellness in a group of veterans, including a military-specific measure of pain's interference in daily life [26]. A systematic review evaluating adults with persistent pain found that nature-based mindfulness leads to reduced self-reported pain and depression and elevated indicators of quality of life [27].

Utility and clinical evidence in FM

Despite the overwhelmingly high prevalence of FM and a well-established understanding of the importance of a multidisciplinary approach, few papers could be retrieved specifically exploring the role of some form of HT in the management of FM. In one publication, a large cohort of women with a mean age of 51 with FM participated in a floristry course. Significant persistent improvements were found in assessments of global physical and mental health, standardized surveys evaluating depression and anxiety, and an FM impact questionnaire. The effect was partly attributed to relief from stress, a triggering of positive emotions, and decreased attention fatigue [28].

Moreover, performing exercise in a forest resulted in less perceived pain and insomnia and more frequent wellness in people with FM [29]. Similarly, another researcher evaluated women with FM following an intervention involving engagement with flowers, stones, and soil organic matter. They found that the intervention resulted in reduced pain intensity and an elevated threshold to pain [30].

One paper found that in addition to better ratings of pain, depression, anxiety, and insomnia, a guided forest hike boosted affect, mood state, friendliness, and mindfulness in patients with FM and related conditions [31]. Another study performed by some of the same authors found similar results in patients who participated in multi-component nature-related activities over a three-month course. The authors also showed that the intervention improved measures of kinesiophobia and physical activity; cognitive emotional regulation and coping; perceived competence, dominance and self-efficacy; and state of arousal [32]. A summary of the studies evaluating nature-based interventions in FM is provided in Table 1.

Critical appraisal of the evidence

Although papers report favorable outcomes, the overall quality of evidence remains limited. Most FM-specific studies included relatively small sample sizes, heterogeneous interventions, and short follow-up

Table 1. Nature-based interventions in fibromyalgia.

Study	Design	Population	Intervention	Main outcomes	Key findings	Major limitations
Yavne et al., 2019 [28]	Prospective cohort	Women with FM	Floristry-based therapy program	SF-36, FIQ, depression and anxiety measures	Significant improvements in physical health, mental health, depression, anxiety, and FM-related symptoms	No control group; limited generalizability
López-Pousa et al., 2015 [29]	Pilot intervention	Patients with FM	Aerobic exercise in a mature forest	Pain, insomnia, well-being	Reduced perceived pain and insomnia; improved well-being	Small sample size; difficult to isolate effect of forest exposure from exercise
Gungormus et al., 2024 [30]	RCT	Women with FM	Multisensory nature-based stimulation	Pain intensity and pain threshold	Reduced pain intensity and increased pain threshold	Short-term intervention
Serrat et al., 2023 [31]	Pilot intervention	Patients with FM and ME/CFS	Guided forest bathing/hiking	Pain, anxiety, depression, insomnia, mood, mindfulness	Improvements across psychological and symptom domains	Limited sample size; lack of long-term follow-up
Serrat et al., 2020 (NAT-FM) [32]	RCT	Patients with FM	Multicomponent intervention including education, exercise, psychological support, and nature exposure	Physical activity, kinesiophobia, coping, self-efficacy, emotional regulation	Improvements in PRO	Contribution of nature exposure cannot be determined

FIQ: fibromyalgia impact questionnaire; FM: fibromyalgia; ME/CFS: Myalgic Encephalomyelitis/Chronic Fatigue Syndrome; PRO: patient-reported outcomes; RCT: randomized controlled trial; SF-36: Short Form-36 Health Survey.

periods. Several studies lacked control groups to account for other factors such as social engagement, increased physical activity, or the mere effect of study participation in a study. In addition, outcome measures varied substantially across studies, limiting comparability. Consequently, the available evidence suggests the potential utility of HT but does not permit definitive conclusions regarding its efficacy or superiority over other non-pharmacologic interventions. The major strengths and weaknesses of the current literature are summarized in Table 2.

Table 2. Strengths and limitations of evidence for horticultural therapy in fibromyalgia.

Strengths	Limitations
Consistent direction of benefit across studies	Very small number of FM-specific studies
Improvements reported in pain, sleep, mood, and QoL	Many studies have small sample sizes
HT appears safe and well-tolerated	Heterogeneous interventions and outcome measures
Findings align with multidisciplinary approach	Limited long-term follow-up
Some controlled and randomized studies available	Few studies include inactive control groups
Biological plausibility supported by mechanistic studies	Causality cannot be established
Potentially scalable and low-cost intervention	Effect of HT often cannot be separated from exercise, socialization, or psychological support

FM: fibromyalgia; HT: horticultural therapy; QoL: quality of life.

Proposed underlying mechanisms

Although the complex interweaving biological processes underlying the potential benefits of HT remain incompletely understood, several pathways have been proposed. These include stress reduction, autonomic regulation, physical activity, sensory stimulation, neuroendocrine modulation, and neuroimmune alterations. These biochemical changes are hypothesized to interact to influence pain perception, psychological well-being, sleep quality, and functional capacity [15, 33–36].

In a study demonstrating better sleep and less anxiety in subjects who participate in horticultural activities, the authors describe some of the ways plant exposure may benefit human health, including engaging sensory-rich material which activates visual, tactile, and olfactory perception, potentially resulting in an unconscious calming response and a state of greater well-being [33]. Furthermore, the chemical basis of particular plants is suggested to elicit stronger effects. For instance, some plants release volatile organic compounds associated with reductions in stress and depressed mood [37]. Others are thought to promote sedation and enhance sleep quality [38].

Another group showed HT-induced brain changes associated with calmness as evidenced by characteristic electroencephalogram (EEG) patterns [39]. Exposure to nature was also associated with improved memory, attention restoration, and wakefulness. Such findings are supported by preliminary evidence showing that immersion in biodiverse environments may modulate neuroimmune pathways. While direct central NT mechanisms remain complex, exposure to biogenic organic compounds has been correlated with significant reductions in systemic cortisol, which has been linked with cognitive and emotional restoration [40, 41]. These effects could be at least partly explained by the enhanced electrical activity in the occipital lobe, signs suggestive of brain comfort and clear wakefulness [42].

Researchers also propose that dampened stress following HT may be tied to modulated levels of glutamate, an NT linked with excitability and implicated in the pathophysiology of FM and related mood disorders. They have found evidence indicating that these outcomes may correlate with cerebral activity changes within pain-related neural networks. Moreover, it is theorized that pain-associated neuroendocrine pathways could result in a diminished release of stress-related cortisol and norepinephrine [34].

Related works reveal that HT may be associated with increased parasympathetic activity and corresponding reduced physiological markers of stress [35]. This potential shift in the balance in favor of a more tranquil state is illustrated by a decrease in both systolic and diastolic blood pressure and a drop in pulse rate in participants of Shiniri-yoku, the Japanese term for forest bathing. This suggested homeostatic resetting was reflected by a more positive emotional state, improved physiological activity levels, and sustained attention [43].

Some papers have also reported decreases in inflammatory biomarkers following HT interventions. In particular, trends toward reduced interleukin (IL)-6 levels, a cytokine associated with chronic age-related inflammation, have been observed [44]. Moreover, preliminary data showing downregulated cellular immunosenescence markers suggest that HT could protect immune surveillance starting as early as middle age [45]. Nonetheless, these findings remain highly inconclusive and warrant rigorous replication.

Likewise, researchers have postulated that exposure to diverse microbiota during HT could influence immune regulation, potentially regulating autoimmune pathways [36]. Analogously, it is proposed that HT may attenuate the neuroimmune axis, theoretically dampening the secretion of pro-inflammatory cytokines and reducing levels of circulating oxidative stress [34]. While the evidence is conflicting and somewhat controversial, in repeated studies, FM has been linked with dysregulated inflammation, underscoring a currently unverified yet putative therapeutic interface for HT based on these hypothesized pathways [46]. The primary proposed mechanisms are summarized in Table 3.

Table 3. Proposed effects of horticultural therapy in fibromyalgia management.

Proposed mechanism	Supporting evidence	Potential relevance to FM
Stress reduction	Reduced anxiety and improved mood [17, 31, 34]	Chronic stress implicated in FM
Sensory stimulation	Exposure to multi-sensory stimuli [31]	Relaxation and attentional distraction
Increased physical activity	Gardening and nature-based low-intensity movement activities [19, 20, 27]	Improved conditioning and reduced kinesiophobia
Autonomic nervous system regulation	Increased parasympathetic activity and reduced physiological arousal [39, 40]	FM associated with autonomic dysfunction

Table 3. Proposed effects of horticultural therapy in fibromyalgia management. (*continued*)

Proposed mechanism	Supporting evidence	Potential relevance to FM
Neuroendocrine modulation	Reduced stress hormone activity [18, 38]	May influence pain perception and fatigue
Neuroimmune regulation	Changes in profile of inflammatory and immunologic biomarkers [44–45]	FM may involve neuroimmune dysregulation
Attention restoration and mindfulness	Improved mindfulness, affect, and emotional regulation [29, 30, 35, 36]	May reduce pain catastrophizing and cognitive fatigue
Social engagement and self-efficacy	Improved coping, competence, and self-efficacy [18]	May improve functional capacity, adaptability, and participation in daily activities

FM: fibromyalgia.

Clinical commentary and practical applications

As described above, FM is a prevalent, multifactorial disorder that impairs function and quality of life. Generally, conventional treatments offer only partial symptomatic relief. HT is a promising modality to integrate into the management of FM.

The benefits of HT include improved measures of pain, sleep quality, focus, and the capacity to cope with stressors. A reduction in perceived pain may be the most apparent primary endpoint to indicate the helpfulness of HT. Nevertheless, many patients with FM are most burdened by symptoms of chronic fatigue, cognitive dysfunction, or irritability. Hence, the various components of HT can address the diverse, interweaving features of FM.

While many forms of integrative medicine have proven worthwhile in the alleviation of FM-related symptomatology, HT possesses distinct therapeutic mechanisms to more adequately treat FM with greater precision. Engagement with natural stimuli, in accordance with human evolutionary predisposition to nature, offers a calming and restorative backdrop for reflection and introspection. The landscape fosters greater attentiveness and focused attention on the immediate surroundings. Accordingly, participants learn self-soothing techniques rather than engaging in ruminative cognitive patterns.

Furthermore, many HT activities involve low-intensity exercise, allowing patients with FM to acclimate and conquer their associated kinesiophobia. Sharing the experience, within a safe space and even in silence, offers a nurturing framework for socialization in which participants may both receive and provide peer support. Gradually, HT-related interventions train people with FM to override the self-limiting perceived thresholds of pain and fatigue. Through repeated practice, neuroplasticity facilitates the pruning of pain-associated neural pathways and a physiological reduction in the aggravating symptoms of FM, ultimately resulting in clinical improvement and enhanced functionality.

Conclusions

Current research indicates that HT may improve selected symptoms experienced by individuals with FM, including pain, sleep disturbance, mood, and general well-being. However, the evidence remains limited by studies relying on small sample sizes, heterogeneous interventions, inadequate controls, and lack of long-term follow-up. Accordingly, HT should be considered a potentially valuable adjunct within a multidisciplinary framework in the management of FM rather than a proven stand-alone treatment. Future RCTs with standardized interventions and clinically meaningful outcome measures are needed in order to solidify the therapeutic role of HT in the treatment of FM and related conditions.

Abbreviations

CBT: cognitive behavioral therapy

FM: fibromyalgia

HT: horticultural therapy

NT: neurotransmitters

RCTs: randomized controlled trials

Declarations

Author contributions

JBS: Conceptualization, Methodology, Investigation, Writing—original draft, Writing—review & editing. The author read and approved the submitted version.

Conflicts of interest

The author declares that she has no competing interests.

Ethical approval

Not applicable.

Consent to participate

Not applicable.

Consent to publication

Not applicable.

Availability of data and materials

Not applicable.

Funding

Not applicable.

Publisher's note

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