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# Qigong and Tai Chi for ME/CFS: A Systematic Review of Randomized Controlled Trials

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## Abstract

**Objective:** Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) is a chronic and debilitating illness with symptoms such as post-exertional malaise and cognitive dysfunction that can be challenging for patients to manage independently. Randomized controlled trials (RCTs) have examined mind-body and psychological approaches that teach patients coping skills for mitigating ME/CFS symptoms, including emerging literature on Qigong or Tai Chi instruction programs. This systematic review aims to summarize the characteristics of these trials and highlight potential areas for future optimization and refinement.
**Methods:** Ovid MEDLINE, Embase.com, Web of Science Core Collection, Cochrane CENTRAL, PsycINFO via Ovid, and ClinicalTrials.gov were searched in April 2023 using controlled vocabulary and keywords for the following eligibility criteria: Sample (ME/CFS), Design (RCT), Behavioral Intervention (mind-body or psychological interventions). Data extraction and reporting followed Cochrane and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.
**Results:** "Qigong" and "Tai Chi" yielded 142 and 80 abstracts, respectively. Of the 222 abstracts, full texts were available for 5 RCTs of Qigong ($k$ = 5; N = 481). Notably, no trials of Tai Chi utilized a randomized control design. Among the 5 Qigong RCTs, the publication range was from 2012 to 2023. Details regarding intervention components and effects were summarized. Qigong intervention sessions (median = 12, mode = 10, 12) tended to last between 1-2 hours and occur across 5-12 weeks (median = 7, mode = 5). The Qigong interventions were all delivered in groups and incorporated at-home practice. Daily practice was a requirement ($k$ = 4) or an advisement ($k$ = 1). Patient-reported outcomes suggest an emerging evidence base for diffuse benefits on physical and emotional health outcomes.
**Conclusions:** Qigong interventions are promising, yet relatively understudied, in improving ME/CFS symptom severity and frequency. Future trials must implement standardized eligibility criteria for ME/CFS history, integrate Qigong or Tai Chi with other empirically supported mind-body and psychological practices, and assess long-term resiliency outcomes relevant to ME/CFS survivorship.

## Keywords

qigong, Tai Chi, ME/CFS, chronic fatigue syndrome, myalgic encephalomyelitis

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## Background

Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) is a complex condition that can impact the ability to complete usual activities spanning all spheres of life (physical and cognitive).[1] Approximately 1.49 million adults in the United States live with ME/CFS, with women being more commonly affected than men.[2]

The primary symptom of ME/CFS is severe and debilitating chronic fatigue that does not improve with periods of rest. Additional symptoms of ME/CFS include post-exertional malaise (PEM), flu-like symptoms, sleep disturbances, cognitive deficiencies, autonomic dysfunction, orthostatic intolerance, and pain, among others.[3,4] Exacerbation of symptoms can be precipitated by increased physical or mental activity or emotional stress. These debilitating symptoms can be difficult for patients to manage independently. Decreased work productivity can directly and indirectly cost ME/CFS patients $31,592 to $41,630 annually.[2] In 2021, the overall estimated economic burden in the U.S. totaled $34.4 to $45.4 billion.[2] In aggregate, the wide-ranging debilitating repercussions of ME/CFS can be experienced by not only the patients but also by their families and the public.

Since stress can precipitate and exacerbate ME/CFS symptoms, psychosocial interventions can offer relief. A psychoneuroimmunological conceptualization of ME/CFS explains the variety of triggers[4] linked to the condition's debilitating symptoms, including stress, chemical exposure,[5] changes in the microbiome, or infections leading to immune system deficiencies.[6] Empirically, observational and longitudinal studies in patients with ME/CFS have demonstrated a positive association between stress-coping abilities and improvements in physical/mental health outcomes.[7,8]

ME/CFS is a medical condition and not due to psychological stress or deconditioning. Given the potential for unmanaged stress and physical deconditioning in these patients, which can exacerbate their underlying medical condition, an accessible form of meditative movement is an imperative yet largely unmet need. The theoretical advantages of a mindful movement intervention (ie, Qigong, Tai Chi) include improving body awareness, decreasing reactivity, and decreasing catastrophizing in the context of physical movement (eg, inclusivity of slow movements, breathing techniques, stretching, and "tranquility of the mind").[9]

This systematic review aims (1) to summarize characteristics of randomized controlled trials (RCTs) with patients diagnosed with ME/CFS with standard criteria and (2) to identify opportunities for future optimization and refinement.

## Methods

### Search Strategy

The systematic search was led by a medical librarian and coauthor (ML). The search was conducted in Ovid MEDLINE, Embase.com, Web of Science Core Collection, Cochrane CENTRAL, and PsycINFO via Ovid and ClinicalTrials.gov using controlled vocabulary and key terms for RCTs, mind-body practices, and ME/CFS. The complete database search strategies are documented in the Appendix, Supplemental Tables 1-5. No restrictions on language were applied. A search filter for randomized controlled trials was used.[10] All identified studies were combined and deduplicated in a single reference manager[11] and then uploaded into Covidence systematic review software.[12] Data extraction and reporting followed Cochrane and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[13] Rating eligible and ineligible studies were conducted through Covidence. The protocol is registered online in the Open Science Framework.

### Eligibility

Included studies were (1) published in English, (2) randomized controlled trials, (3) testing a behavioral intervention incorporating the phrase of Qigong or Tai Chi, and (4) including only patients diagnosed with ME/CFS. We did not review any manuscripts that were protocol only, abstract only, and excluded duplicate findings. We did not limit based on style of practice. We also did not limit studies based on the diagnostic criteria for ME/CFS in the study sample. Although post-exertional malaise is now recognized by the Institute of Medicine (IOM) as 1 of the key criteria for diagnosing ME/CFS,[14,15] it was not required to fulfill Fukuda criteria (1994).[16] Approximately 47% of individuals diagnosed with the Fukuda criteria also endorse experiencing post-exertional malaise.[17] Acknowledging this potential for sample heterogeneity, we also summarized findings on post-exertional malaise from all included studies.

### Data Extraction

Data was coded independently by a primary coder (MM), a secondary coder (ET), and a senior coder (DH) to reconcile differences. The following data were extracted from each study: publication date, ME/CFS diagnostic criteria, origin country, session length, total session duration, session frequency, delivery format, sample size, control arm, measures, and between-group effects on ME/CFS symptoms.

### Risk of Bias

Risk of bias was assessed independently by 2 coders (MM, ET) and a senior coder (DH) to reconcile differences. a risk of bias assessment evaluating the following criterions as low, high, or unclear: selection bias, performance bias, detection bias, attrition bias, reporting bias, and other sources of bias. A global score will be assigned to each study (sum of domains with "low risk of bias"), thus the score ranges from zero to 7,

with higher scores indicating lower risk of bias and better quality of study.

## Results

### Literature Search

As illustrated in the PRISMA diagram (Figure 1), the search yielded 2517 results. After removing 1605 duplicates, 1383 records were excluded (no Tai Chi or Qigong interventions), leaving 222 records to be screened. Of the 222 records screened, 142 yielded Tai Chi interventions, and 80 yielded Qigong interventions. Notably, the Tai Chi records were excluded for not including RCTs. Only 5 Qigong studies included RCT and met our eligibility criteria.[18-22]

### Characteristics of RCTs

Among included RCTs ($k$ = 5), the publication range was 2012 to 2023. Most studies ($k$ = 4) used the CDC 1994 Fukuda diagnostic criteria,[16] and the remaining study used the 2015 Institute of Medicine (IOM) diagnostic criteria.[14,15] All 5 studies were conducted outside the U.S., with $k$ = 2 occurring in China and $k$ = 3 in Hong Kong. Qigong intervention included Yijinjing ($k$ = 1), Prolong Life with 9 Turn ($k$ = 1), Baduanjin Qigong ($k$ = 1), and Wu Xing Ping Heng Gong ($k$ = 2) where sessions tended to last between 60-120 mins (med = 90 mins, mode = 60,120 mins), occur across 5-12 weeks (median = 7, mode = 5), and include 10-16 sessions (med = 12, mode = 10,12). All studies were delivered in groups and incorporated at-home Qigong practice. The sample size of each study varied from N = 40 to N = 150. Most commonly, the control condition used a waitlist ($k$ = 3) or cognitive behavioral therapy ($k$ = 2).

### Risk of Bias Assessment

One study was scored a 7,[17] 1 study was scored a 5,[19] and the remaining 3 studies received a score of 6.[18,20,21] The complete assessment is documented in the Appendix, Supplemental Figure 1.

### Between-group effects on ME/CFS symptoms

Table 1 summarizes statistical results comparing the effect of Qigong or Tai Chi (versus control) on ME/CFS symptoms (sample size, $P$-value). Outcomes assessed include Fatigue ($k$ = 3 Chalder's Fatigue Scale (ChFS) and $k$ = 2 Multidimensional Fatigue Inventory-20 (MFI-20)); Sleep quality ($k$ = 3 Pittsburgh Sleep Quality Index (PSQI)); Anxiety and Depression ($k$ = 2 Hospital Anxiety and Depression Scale (HADS)); Physical health status ($k$ = 1 Short Form Health Survey-36 (SF-36) and $k$ = 1 Short Form Health Survey-12 (SF-12)); Neuropeptides ($k$ = 1); Telomerase ($k$ = 1).

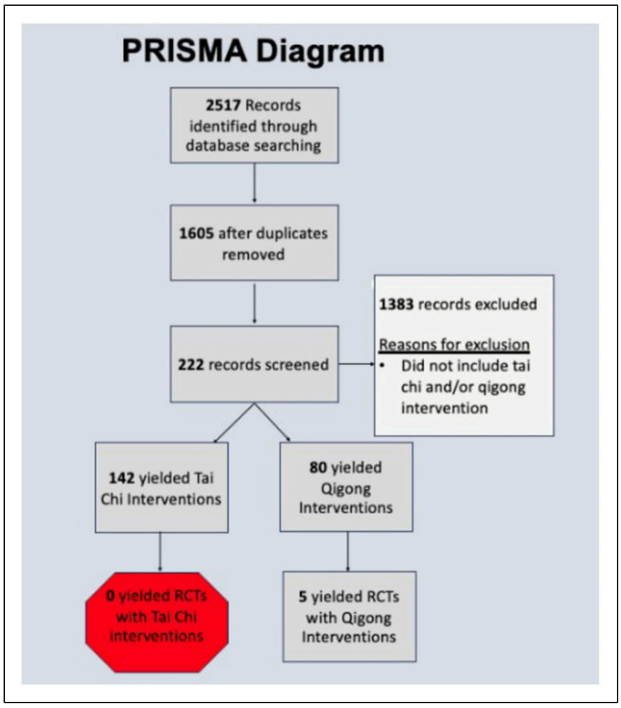


**Figure 1.** Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram.

Overall, there was consistent evidence for significant group-by-time improvements in fatigue as measured by the Chalder's Fatigue Scale ($P < 0.001$)[20-22] and the Multidimensional Fatigue Inventory-20 (ps = 0.01 to 0.0001).[18,19] Increases in telomerase activity were also found in the Qigong group compared to the control arm ($P = 0.029$).[22] However, effects on secondary outcomes were more mixed, specifically regarding sleep quality (ps = 0.013-0.828),[19,20] anxiety (ps = 0.016-0.584),[19-21] depression (ps = 0.001-0.105) ,[19-21] physical function (ps = 0.015-0.484),[18,22] mental health (ps = 0.001-0.069), and neuropeptide Y in peripheral blood ($P = 0.008$).[19]

## Discussion

ME/CFS is a disabling medical condition that affects children and adults. At present, there is no cure for this illness, and treatment is unfortunately limited to the improvement of symptoms. This systematic review synthesizes the breadth of randomized controlled trials that have evaluated Qigong and Tai Chi among patients with ME/CFS. Our findings have multiple implications to guide future research and clinical care to improve mental and physical health symptoms in patients navigating this onerous disease.

Qigong shows potential for improving ME/CFS symptom severity and frequency, although this intervention remains understudied. Most of these trials involving ME/CFS patients were conducted outside the United States in Europe or Asia. No Qigong RCTs have been conducted for patients with ME/CFS in the United States. These data suggest a missed opportunity and

**Table 1.** Between-group Effects on ME/CFS Symptoms From RCTs of Qigong or Tai Chi.

| ChFS Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| Total | | | ***P* < 0.001** | ***P* < 0.001** | ***P* < 0.001** |
| Physical fatigue | | | ***P* < 0.001** | ***P* < 0.001** | ***P* < 0.001** |
| Mental fatigue | | | ***P* < 0.001** | ***P* = 0.050** | ***P* = 0.012** |

**Note:** ChFS = Chalder Fatigue Scale. *P*-values of .05 or less are indicated in bold font.

| MFI-20 Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| General fatigue | ***P* = 0.003** | *P* = 0.516 | | | |
| Physical fatigue | ***P* = 0.016** | *P* = 0.435 | | | |
| Reduced activity | ***P* = 0.017** | *P* = 0.593 | | | |
| Reduced motivation | ***P* = 0.003** | *P* = 0.482 | | | |
| Mental fatigue | ***P* = 0.001** | *P* = 0.282 | | | |

**Note:** MFI-20 = Multidimensional Fatigue Inventory-20. *P*-values of .05 or less are indicated in bold font.

| PSQI Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| Total | ***P* = 0.013** | *P* = 0.828 | *P* = 0.064 | | |
| Subjective sleep quality | | *P* = 0.532 | ***P* = 0.002** | | |
| Sleep latency | | *P* = 0.685 | ***P* = 0.044** | | |
| Sleep duration | | *P* = 0.609 | *P* = 0.151 | | |
| Sleep efficiency | | *P* = 0.142 | *P* = 0.522 | | |
| Sleep disturbance | | *P* = 0.783 | *P* = 0.062 | | |
| Use of sleep medication | | *P* = 0.326 | *P* = 0.803 | | |
| Daytime dysfunction | | *P* = 0.593 | *P* = 0.253 | | |

**Note:** PSQI = Pittsburgh Sleep Quality Index. *P*-values of .05 or less are indicated in bold font.

| HADS Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| Anxiety | | *P* = 0.198 | ***P* = 0.016** | *P* = 0.584 | |
| Depression | | *P* = 0.105 | ***P* < 0.001** | ***P* = 0.002** | |

**Note:** HADS = Hospital Anxiety and Depression Scale. *P*-values of .05 or less are indicated in bold font.

| SF-36 Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| Physical function | ***P* = 0.015** | | | | *P* = 0.484 |
| Role physical | *P* = 0.369 | | | | |
| Bodily pain | ***P* = 0.030** | | | | |
| General health | ***P* = 0.005** | | | | |
| Vitality | ***P* = 0.017** | | | | |
| Social function | *P* = 0.394 | | | | |
| Role emotion | *P* = 0.073 | | | | |
| Mental health | *P* = 0.069 | | | | ***P* = 0.001** |

**Note:** SF-36 = Medical Outcomes Study 12-Item Short-Form Health Survey. *P*-values of .05 or less are indicated in bold font.

| NPY and Telomerase Between-Group Effects | Xie, 2023 (N = 40) | Xie, 2022 (N = 90) | Chan, 2014 (N = 150) | Chan, 2013 (N = 137) | Ho, 2012 (N = 64) |
|---|---|---|---|---|---|
| NPY | | ***P* = 0.008** | | | |
| Telomerase | | | | | ***P* = 0.029** |

**Note:** NPY = Changes in Neuropeptide Y. P-values of .05 or less are indicated in bold font.

that patients in the U.S. may find Qigong appealing if given the chance to try the practices.

This review identified multiple areas for further inquiry. An area for further investigation could include piloting an intervention incorporating Tai Chi. As described in this review, although no Tai Chi RCTs met eligibility criteria, 2 Tai Chi intervention trials would have been otherwise eligible but enrolled healthy control as a comparator and were thus nonrandomized.[23,24] Li et al[23] found that Tai Chi Chuan improved functional plasticity in ME/CFS patients . Wu et al[24] identified 60 functional brain connections associated with Tai Chi and decreased fatigue and sleep complaints by boosting the left frontoparietal and default mode networks . Notably, both ineligible studies described the various regions of the brain that may be implicated by ME/CFS and how Tai Chi and Qigong may improve functional connectivity. Of the eligible studies in the present systematic review, none investigated functional brain connectivity nor specified whether bedridden individuals could participate in the Qigong interventions.

The semantics of the terms Tai Chi and Qigong overlap significantly. New research initiatives involving Tai Chi in varying U.S. populations (eg, chronic musculoskeletal pain) have increased over the past decade.[25,26] Despite clear differences between adults with multisite pain and patients with ME/CFS (eg, post-exertional malaise), the myalgic encephalomyelitis portion of an ME/CFS diagnosis involves muscle pain related to central nervous system inflammation (ie, neuroinflammation).[27] Irwin et al.[26] described Tai Chi as a helpful intervention for reducing elevated levels of specific inflammatory markers, suggesting that incorporating this behavioral intervention could provide ME/CFS symptom relief.

Additional RCTs are needed that implement standardized eligibility criteria for ME/CFS history, integrate Qigong or Tai Chi with other empirically supported psychological practices, and assess long-term resiliency outcomes relevant to ME/CFS survivorship. We only included RCTs conducted with patients with a confirmed ME/CFS diagnosis. However, this conservative approach led to the exclusion of trials with patients with "ME/CFS-like illness," fibromyalgia, or Long COVID. In the United States, the prevalence of ME/CFS (0.3%) is far smaller than fibromyalgia (4%)[28] or Long COVID (15% of adults post-COVID-19 diagnosis).[29] Thus, there may be an opportunity to compare the benefits and challenges of Qigong and Tai Chi among these phenomenologically similar patient populations.

Recently, mounting evidence points to the overlapping symptoms between ME/CFS and Long COVID, a syndrome characterized by persistent fatigue, cognitive problems, headaches, disrupted sleep, myalgias and arthralgias, post-exertional malaise, and orthostatic intolerance.[30] Research is urgently needed to explicate the role of Qigong and Tai Chi in targeting common disease mechanisms, including disruptions in lung capacity, central and autonomic nervous system functioning, immune system functioning, gut microbiome, and other metabolic processes.[30,31]

This systematic review included limitations. No data were evaluated on the lineage or level of training of the qigong practitioners. These details may reside in clinical databases (eg, the Qi Gong Institute database) and could inform aspects of Qigong instruction that are especially helpful for patients with ME/CFS.

## Author Contributions

All authors contributed to conceptualizing, writing, and reviewing the final manuscript.

## Declaration of Conflicting Interests

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## Supplemental Material

Supplemental material for this article is available online.

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