REVIEW ARTICLE

Yoga for Quality of Life in Individuals With Chronic Disease: A Systematic Review

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ABSTRACT

Background • Chronic diseases, including heart disease, stroke, cancer, and chronic pulmonary disease are the leading causes of death and disability worldwide. Compounding symptoms and loss of function, people living with chronic disease often experience reduced quality of life (QoL). Various physical and mental practices have been shown to relieve stress and improve QoL. Yoga is a physical and mental practice that may be a viable approach for improving QoL in people with chronic disease.

Objective • The objective of this study was to examine and summarize the evidence for the effectiveness of yoga on QoL in patients with chronic disease.

Design • The study design was a a systematic review with qualitative synthesis.

Methods • We included randomized controlled trials that evaluated the effect of yoga on QoL or health-related QoL (HRQoL) for individuals with chronic disease. We included only studies that used at least 1 previously validated measure of QoL or HRQoL and specified a minimum duration of follow-up of at least 1 wk.

Interventions • We included both movement-based and breath-based yoga practices. Studies that included yoga as part of a larger intervention program (eg, mindfulness-based stress reduction training) or studies that did not provide findings specific to yoga were excluded.

Primary Outcome Measures • The primary outcome analyzed was improvement in QoL as measured by a validated QoL or HRQoL scale.

Results • Among the 1488 studies that were identified on initial search, 7 articles met all inclusion criteria. Five studies reported a statistically significant advantage over usual care alone for improvement of QoL in patients with chronic disease, but the clinical significance of the differences was clear in only 1 trial. We found considerable heterogeneity among the included studies and study quality was generally low.

Conclusions • More high-quality research is needed to determine the value of yoga as an adjunctive approach to improving QoL in patients with chronic disease. (*Altern Ther Health Med.* 2018;25(1):36-43.)

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INTRODUCTION

Chronic diseases such as heart disease, stroke, cancer, and chronic pulmonary disease are the leading causes of death and disability worldwide.[1] Chronic diseases cause 68% of the world's deaths and are common in both developed and undeveloped countries.[1] Compounding the symptoms and loss of function caused by illness, people living with chronic disease often experience reduced quality of life (QoL). For individuals with chronic disease, QoL is most often referred to as health-related quality of life (HRQoL),[2] a measure of how health status affects QoL through disease, injury, treatment or policy.[3] Chronic conditions associated with reduced HRQoL include cancer, heart disease, stroke, diabetes, human immunodeficiency virus (HIV), gastrointestinal disorders, renal disease, and disorders of the

central nervous system.[4] Wilson and Cleary[5] described a multidimensional model of HRQoL that includes biological and physiological factors, symptoms, functioning, general health perceptions, and overall QoL, and they identified causal links between clinical variables and measures of HRQoL. The fact of receiving a diagnosis of chronic disease in and of itself is a stressful event for patients and may lead to anxiety, depression, and fear of progression, recurrence of diseases, loss of self-control, social changes, and other changes that adversely affect QoL.[6] Usual medical care for patients with chronic conditions typically includes prescription medication. However, medications prescribed for chronic conditions often cause adverse effects that further reduce patient QoL.[6-8] Usual medical care for people with chronic diseases also includes counseling on diet and lifestyle changes, including adequate rest and regular exercise.[9] Various physical and mental practices have been shown to relieve stress and improve QoL.[10]

Yoga is a physical and mental practice that may be a viable approach for improving QoL in people with chronic disease. Yoga is a multifaceted practice that includes physical movement, breath regulation, and meditative components. Yoga originated in India more than 2000 years ago.[6] *Yoga* means "union," and yoga practice is intended to unite and integrate the participant's mind, body, and spirit.[11] It is believed that many of yoga's benefits result from the combination of physical exercise, conscious breathing, and focusing of the mind.[12,13] Yoga is practiced as a means of reducing stress and preventing illness among healthy people and may also be effective as part of a treatment regime for chronic disease.6 Yoga may improve QoL by relieving stress, pain, anxiety, depression and fatigue, and improving sleep and mood.[6,7,14,15] Despite the increasing volume of research on the benefits of yoga for care of various clinical populations,[16] no quantitative review has been published on the effectiveness of yoga for QoL among patients with chronic disease. We performed this systematic review to examine and summarize the evidence for the effectiveness of yoga on QoL in patients with chronic disease.

METHODS

Review Protocol

We developed a protocol outlining a systematic approach to identification and selection of relevant studies, using standard methodology for analysis as described in the Cochrane Handbook, and applying the PRISMA guidelines for reporting of findings.[17]

Study Eligibility Criteria

To be eligible for this systematic review, research studies had to be randomized controlled trials that evaluated the effect of yoga on QoL or HRQoL for individuals with chronic disease, compared with a control intervention or usual care alone. Types of yoga practice eligible for inclusion in this review were both movement-based practices (asana) and breath-based practices (pranayama). Studies that included yoga as part of a larger intervention program (eg, mindfulness-based stress reduction training) or studies that did not provide findings specific to yoga were excluded. We included only studies that used at least 1 previously validated measure of QoL or HRQoL and specified a minimum duration of follow-up of at least 1 week.

Outcome Measures

Primary Outcome. The primary outcome analyzed was improvement in QoL as measured by a validated QoL or HRQoL scale. Accepted scales included short form 36 (SF -36),[18] St George's respiratory questionnaire (SGRQ),[19] World Health Organization quality of life (WHOQOL-BREF),[20] short form 12 (SF-12),[21] and the multiple sclerosis quality of life (MSQoL-54).[22] As a secondary measure, we evaluated reporting of adverse outcomes.

Search Methods

We performed a literature search of articles published through May 2016. We searched Medline, the Cochrane Library, Cochrane Center Registry of Controlled Trials, and Alternative Health Watch. The search method incorporated National Library of Medicine Medical Subject Heading terms with a text word search. The search string used for this systematic review was *yoga* OR *yogic* OR *asana* OR *pranayama* AND *quality of life* OR *life quality* OR *health-related quality of life*. The literature search was restricted to reports of randomized controlled trials involving human subjects, published in English in a peer-reviewed journal. References of selected articles were searched for any additional studies that were missed by the initial search. We also used the same search string to identify relevant systematic reviews and meta-analyses and reviewed the reference sections of those articles to identify randomized controlled trials eligible for inclusion in our review.

Study Selection

We combined the results of all searches and removed duplicates. One author (AK) screened the titles and abstracts of the initial search results to remove studies that did not meet inclusion criteria. Two authors (AK and JW) reviewed the remaining articles to determine whether they met the predetermined inclusion criteria. Both reviewers conducted full-text reviews to make final determinations regarding study inclusion. Disagreements between the reviewers were resolved through discussion, and consensus between the reviewers was required for study inclusion.

Data Extraction and Quality Assessment

We collected data regarding study methodology and outcomes from published studies that met inclusion criteria using a piloted, standardized data collection form to extract the data independently from each study. One reviewer extracted data from each eligible study; the work was reviewed by a second reviewer, and disagreements were

resolved by consensus. We collected data related to study details (first author's name, year of publication, and country where the study was conducted), subject characteristics (number of participants, average subject age, and chronic disease diagnosis), intervention details (type, frequency and duration of intervention), outcome measures used, results of interventions, and adverse events reported.

Assessment of Study Quality and Validity

To assess the quality of the included studies, we analyzed study methodologies using the tool for assessing the risk of bias included studies in in the *Cochrane Handbook for Systematic Reviews of Interventions* 5.0.1.[23] Two reviewers independently assessed the risk of bias for each study, and discrepancies were resolved by consensus. Four domains related to the risk of bias were assessed: (1) sequence generation; (2) allocation concealment; (3) blinding of participants, clinical staff, and outcome assessors; and (4) incomplete outcome data. We assessed the validity of included studies with the external validity assessment tool (EVAT), which measures the generalizability of research to other individuals (external validity) and settings outside the study population (model validity).[24]

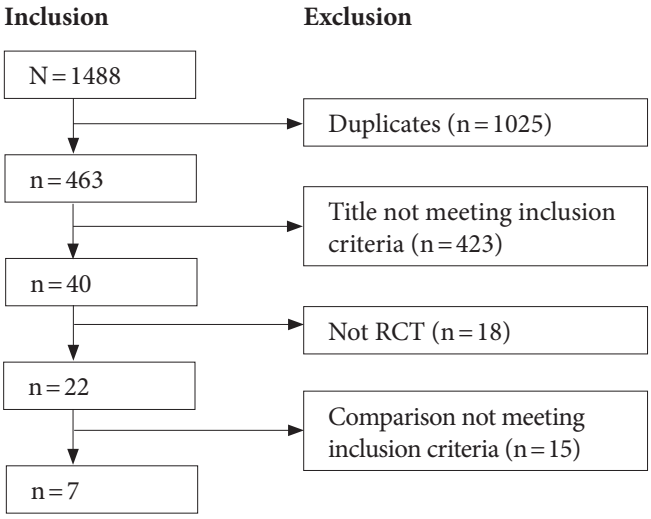
Data Synthesis and Analysis

Two authors independently reviewed each study and populated the evidence table, showing for each study the outcome measure(s), time point(s) for measurement of outcomes, effect measure(s), *P* values, 95% confidence intervals (CIs), information on compliance and clinical significance, adverse events, and authors' conclusions. For the primary analysis, which was based on outcome measurement for QoL, we initially intended to pool studies evaluating the effectiveness of yoga for homogenous patients with each chronic disease represented in the set of selected studies. However, the study populations, interventions, and outcome measures were heterogeneous across studies, with insufficient homogeneity across any 2 or more studies to permit any pooling or meta-analyses to be conducted. The included studies were therefore synthesized qualitatively.

RESULTS

A total of 1488 studies were identified on initial search based on the specified inclusion criteria. Upon review of these initial results, we removed duplicates (1025), studies with titles inconsistent with inclusion criteria (423), and studies that were not randomized controlled trials (18). Of the remaining 22 articles, 15 more were excluded after full-text review revealed that the studies did not compare yoga with usual care by at least 1 QoL outcome. The remaining 7 articles met all inclusion criteria (Figure 1).[6-8,11,14,25,26] Both authors (AK and JW) involved in the screening of articles agreed on the inclusion of the same 7 articles, and neither author selected any additional studies for inclusion.

Figure 1. Flow of Citations Through the Retrieval and Screening Processes



Abbreviation: RTC, randomized controlled trial.

Study Characteristics

The included studies were published between 2010 and 2015 (Table 1). The study populations were drawn from the United States (5), Iran (1), and India (1), with sample sizes ranging from 19 to 71 randomized participants. None of the articles reported trial registration in clinicaltrials.gov or any other registry. Three articles classified the trial as a pilot, feasibility, or exploratory study.[7,11,14] Three trials included women only.[6,8,25] Chronic diseases included breast cancer, other types of cancer, asthma, type 2 diabetes, rheumatoid arthritis, multiple sclerosis, and HIV infection. All studies were 2-arm trial designs with a yoga intervention arm and controls assigned to either no intervention or a waitlist, or to usual or standard care. Because all patients were under medical care, we equated no intervention or waitlist with usual care alone.

The types of yoga used in the studies included both posture and breathing practices, but no 2 studies used identical yoga interventions, and types of yoga varied widely across studies. Intervention periods ranged from 3 days to 3 months; outcome time points ranged from 1 week to 9 months posttreatment. The SF-36 was the most common QoL outcome measure used (3 studies). See Table 1.

Methodological Quality

The quality of included studies was generally low and in many cases the trials were not reported well enough for risk of bias to be adequately assessed (Table 2). There were no disagreements between the authors appraising the articles. Three[8,14,25] and 6 trials,[6-8,14,25,26] respectively, were rated as having a high risk of bias from sequence generation and allocation concealment; risk of bias due to deficiencies in outcomes assessment was uncertain in 6 of the 7 trials[6-8,11,25,26]; and absence of reporting bias was unclear in all of the trials.

Table 1. Summary of Included Studies

Study	Recruitment	Participants (n)	Age range (y)	Inclusion criteria	Yoga intervention	Usual care	QoL measure(s)	Follow-up
Chandwani et al (2010)[6]	University-based cancer center in the United States	137 screened 71 randomized 10 dropout	31.8 to 67.9 (51.39 mean age in yoga group, 54.02 mean age in control group)	Women with stage 0 to III breast cancer, 18+ y old, able to read, write, and speak English, scheduled to undergo radiotherapy at the University of Texas M.D. Anderson Cancer Center	Two 60-min yoga classes weekly for 6 wk, program adapted from Patanjali's *Yoga Sutras* text in collaboration with faculty from the Vivekananda Yoga Anusandhana Samsthana (n = 30)	Waitlist control (radiotherapy) (n = 31)	SF-36 PCS, MCS, and subscales	1 wk 1 mo 3 mo
Bidwell et al (2012)[8]	Physicians' offices and university campus in the United States	Unknown number screened 19 randomized 0 dropout	Unknown age range of participants but between 20 and 65 y (43 mean age in yoga group, 40 mean age in control group)	Females 20 to 65 yold, clinical and functional evidence of mild-to-moderate physician-assessed asthma, forced expiratory volume /forced expiratory capacity ratio of <80% of predicted, daily bronchodilator use, wheezing and/or coughing symptoms for 2+ y improved spontaneously or with drug therapy	Two 60-min supervised yoga sessions weekly for 10 wk conducted by a certified yoga instructor (YogaFit) trained in relaxation and yoga poses; yoga (postures) asanas all part of a traditional Hatha yoga practice (n = 12)	Standard treatment of asthma (n = 7)	St. George's respiratory questionnaire	10 wk
Jyotsna et al (2012)[26]	Outpatient department in India	210 screened 49 randomized 3 dropout	Unknown age range of participants (50.59 y mean age in yoga group, 45.27 y mean age in control group)	Type 2 diabetics on treatment with lifestyle modification (exercise and diet control according to ADA recommendations) plus oral hypoglycemic agents having HbA1c between 6% and 9% for 3+ mo	Comprehensive 3-d Sudarshan Kriya Yoga program of yogic movements and postures (asanas), relaxation practices, meditation, group processes, and discussion of stress-relieving principles under guidance of a certified teacher (n = 27)	Standard treatment of diabetes (n = 22)	WHO QOL BREF	6 mo 9 mo
Dhruva et al (2012)[11]	University in the United States	46 screened 23 randomized 5 dropout	Unknown age range of participants (52.4 y mean age in yoga group, 56.0 y mean age in control group)	Receiving intravenous chemotherapy for a cancer diagnosis, visual analog scale score for fatigue of 4+ of 10, and Karnofsky Performance Status 31+ of 60	Pranayama intervention consisting of a 60-min class once weekly and twice daily home practice totaling 20 to 30 min per day (n = 9, n = 8 in analysis)	Wait-list control (chemotherapy) (n = 9, n = 8 in analysis)	SF-12 PCS and MCS	Following each cycle of chemotherapy
Evans et al (2013)[14]	Rheumatology offices and local community bulletin boards, arthritis support groups, physician referrals, online sources in the United States	73 screened 30 randomized 4 dropout	Unknown age range of participants (29.9 y mean age in yoga group, 27.1 y mean age in control group)	Rheumatologist diagnosis of rheumatoid arthritis for 6+ mo (revised 1987 American College of Rheumatology criteria) or juvenile idiopathic arthritis for 6+ mo, 16 to 35 y old, concomitant use of disease modifying antirheumatic medications, nonsteroidal anti-inflammatory drugs, or low-dose corticosteroids permitted provided doses stable for 4 wk, ability to provide written informed consent and speak and understand English	90-min Iyengar yoga classes from an experienced teacher held twice weekly for 6 wk (n = 14)	Waitlist control (usual care) participants contacted weekly by a research assistant who administered a monitoring form (n = 16)	SF-36 subscales: Bodily pain Vitality Mental health General health	Posttreatment 2 mo
Doulatabad et al (2013)[25]	Kohgiloyeh and Boyerahmad provinces in Iran	Unknown number screened 60 randomized 0 dropout	18 to 45 y (31.6 mean age of participants, both groups combined)	Women 18 to 45 y old with a diagnosis of multiple sclerosis for 2+ y and the ability to do yoga	Eight 60- to 90-min sessions per month for 3 mo, based on the Ashtanga yoga founded on 3 principles: (1) slow-motion exercising (hatha); (2) breathing exercises or life force absorption through yoga breathing (pranayama); and (3) mind focus and establishment of control through meditation, extension and quiescence (Raja) (n = 30)	No intervention (n = 30)	Multiple sclerosis quality of life-54	4 mo (1-mo post 3-mo intervention period)
Agarwal et al (2015)[7]	Patient education program of the division of infectious diseases at a university in the United States	Unknown number screened 24 randomized 0 dropout	Unknown age range of participants (47.0 y mean age in yoga group, 49.3 y mean age in control group)	Affirmative answers to: (1) Do you use or have you used drugs (ie, crack cocaine?; (2) Are you HIV positive?; and (3) Do you speak and/or understand English?	Two 60-min sessions for 2 mo (16 sessions) taught by a certified yoga instructor; program provided all the essential elements of different yogic techniques (ie, warm-up yogic body movements, breathing techniques, meditation, yogic asana, and sava asana [yoga Nidra] for relaxation) (n = 12)	No intervention (n = 12)	SF-36 subscales: physical functioning role-physical general health vitality social functioning role-emotional mental health bodily pain	Posttreatment (2 mo) 4 mo

Table 2. Risk of bias of included studies

Study	Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcomes Assessment	Completeness of Outcome Data	Absence of Reporting Bias	Other Sources of Bias
Chandwani et al (2010)[6]	Low Risk	High Risk	N/A	Unclear	Low Risk	Unclear	N/A
Bidwell et al (2012)[8]	High Risk	High Risk	N/A	Unclear	Unclear	Unclear	N/A
Jyotsna et al (2012)[26]	Low Risk	High Risk	N/A	Unclear	Unclear	Unclear	N/A
Dhruva et al (2012)[11]	Low Risk	Low Risk	N/A	Unclear	Low Risk	Unclear	N/A
Evans et al (2013)[14]	High Risk	High Risk	N/A	Low Risk	Low Risk	Unclear	N/A
Doulatabad et al (2013)[25]	High Risk	High Risk	N/A	Unclear	High Risk	Unclear	N/A
Agarwal et al (2015)[7]	Low Risk	High Risk	N/A	Unclear	Low Risk	Unclear	N/A

Three of the 7 trials[7,8,25] did not report the number of potential participants screened for eligibility. In 4 of the articles,[7,11,14,26] age ranges of participants were not reported. Dropout rates ranged from 0% to 22%. Five of the trials[6,7,11,14,26] reported at least 1 measure of compliance.

In the majority of studies, the source population appeared to be reflective of the target population to which the results were meant to be inferred, but many articles lacked detail sufficient to permit adequate appraisal of the trial's generalizability.[7,8,25,26] In addition, the training, experience, and characteristics of the yoga instructors were not reported in the majority of articles, and the yoga protocols were not described with enough detail to allow for replication in most cases. Outcomes were assessed statistically in all cases, with *P* values reported for between-group differences; however, we noted 3 ways in which the statistical analyses were deficient in several of the included studies: (1) Primary outcomes and time points were not distinguished from other outcomes and time points in any of the trials (4 trials[6,7,11,14] reported on more than 1 QoL outcome, and 5 trials[6,7,11,14,26] measured outcomes at multiple time points); (2) CIs reflecting uncertainty in the yoga versus the control group estimates were reported in only 1 trial[11]; (3) Clinical significance was discussed explicitly in only 2 articles,[6,8] only one[6] of which differentiated clinical significance from statistical significance.

Adverse Events

Methods of assessing adverse events were reported in only 2 of the articles.[11,14] No adverse events were reported in any of the studies,

Data Synthesis

As noted under methods, we found considerable heterogeneity among the included studies (Table 3). Two trials reported on 1 QoL measure at a single time point,[8,25] 1 reported on 1 QoL outcome at 2 points,[26] 1 reported on 2 QoL outcomes at 2 time points,[11] 1 trial reported on 3 QoL outcomes at 3 time points,[6] 1 trial reported on 4 QoL outcomes at 2 time points,[14] and another reported on 8 QoL outcomes at 2 time points.[7]

In the study by Chandwani et al,[6] women with breast cancer were assigned to two 60-minute yoga classes weekly for 6 weeks in a program adapted from Patanjali's Yoga Sutras text in collaboration with faculty from the Vivekananda Yoga Anusandhana Samsthana. The subjects in the intervention arm had statistically significant improvements, on average, in SF-36 physical component and general health scores at 1 week but not at longer term follow-up (1 and 3 mo). No between-group differences were detected in the mental component score at any time point.

In the study by Bidwell et al,[8] asthmatic women assigned to two 60-minute supervised yoga sessions were weekly for 10 weeks conducted by a certified yoga instructor (YogaFit). The subjects in the intervention arm were trained in relaxation and yoga poses and improved by 13.49 points on the SGRQ as compared with an increase of 4.85 points among women in the usual care alone group ($P < .05$).

In the study by Jyotsna et al,[26] patients with type 2 diabetes on treatment with lifestyle modification and oral hypoglycemic agents were assigned to a comprehensive 3-day Sudarshan Kriya Yoga program of yogic movements and postures (asanas), relaxation practices, meditation, group processes, and discussion of stress-relieving principles under the guidance of a certified teacher. Subjects in the intervention arm had superior QoL according to the WHOQOL-BREF at the 9-month follow-up (279.04 vs 259.15, $P = .01$), but not at the 6-month follow-up (267.04 vs 269.35, $P = .88$).

The study by Dhruva et al[11] recruited patients with cancer on chemotherapy and with visual analog scale scores for fatigue of 4+ out of 10, and Karnofsky performance status scores of 31+ out of 60. The subjects were assigned to a pranayama intervention consisting of a 60-minute class once weekly and twice daily 20- to 30-minute home practice. The subjects in the intervention arm had improvements in the

Table 3. Outcome Measures and Effects

Source	QoL Outcome	Time	Effect measure	*P* and/or 95% CI	Compliance/Clinical significance	Adverse events	Authors' conclusions
Chandwani et al (2010)[6]	SF-36 PCS SF-36 MCS SF-36 general health	1 wk 1 mo 3 mo	Yoga vs control group differences adjusted for age, stage of cancer, time since diagnosis, type of surgery, prior chemotherapy, and baseline value of the outcome measure at: 1 wk: SF-36 PCS: 43.1 vs 39.0 SF-36 MCS: 49.7 vs 49.9 SF-36 GH: 78.8 vs 66.6 1 mo: (SF-36 PCS: 44.9 vs 44.4 SF-36 MCS: 52.8 vs 50.6 SF-36 GH: 71.6 vs 64.3 3 mo: SF-36 PCS: 46.9 vs 44.8 SF-36 MCS: 50.9 vs 50.4 SF-36 GH: 69.1 vs 64.5	SF-36 PCS: 1 wk, $P = .04$ 1 mo, $P = .87$ 3 mo, $P = .42$ SF-36 MCS: 1 wk, $P = .92$ 1 mo, $P = .38$ 3 mo, $P = .87$ SF-36 GH: 1 wk, $P = .005$ 1 mo, $P = .08$ 3 mo, $P = .31$	Fifteen participants (50%) attended all 12 classes; 8 (28%) attended 11 classes; and 1 (3%) attended 10 classes; 1 attended just 2 classes; the remaining 5 participants attended 3, 4, 5, 7, or 8 classes	No information on method for assessing or number of adverse events	Yoga associated with statistically and clinically significant improvement in some aspects of quality of life
Bidwell et al (2012)[8]	St George's respiratory questionnaire	10 wk	Yoga vs control group pre-post difference in mean improvement: Yoga: 29.5 to 16.01 (-13.49) Control: 27.0 to 31.85 (+4.85)	$P < .05$	No information on compliance; a change of 4+ points on the SGRQ considered clinically significant	No information on method for assessing or number of adverse events	Preliminary evidence suggesting that 10 wk of yoga improves quality of life in persons with asthma
Jyotsna et al (2012)[26]	WHO QOL BREF	6 mo 9 mo	Yoga vs control group differences in means (total scores): 6 mo: 267.04 vs 269.35 9 mo: 279.04 vs 259.15	6 mo: $P = .88$ 9 mo: $P = .01$	Compliance defined as number of short kriya ≥30 (33% of short kriyas) and number of long kriya ≥3 (25% of long kriyas) or number of long kriya ≥6 (50% of long kriyas); only 16 of the 27 (59%) yoga participants compliant according to the above criteria	No information on method for assessing or number of adverse events	Significant improvement in quality of life of the group practicing comprehensive yogic breathing compared with the group following standard treatment alone
Dhruva et al (2012)[11]	SF-12 PCS SF-12 MCS	Study midpoint Study end	1. Yoga vs control group differences in means at study midpoint (prior to control group's receipt of the intervention): SF-12 PCS: 46.1 vs 52.3 SF-12 MCS: 52.8 vs 43.8 2. Mean change per unit of yoga dose (number of hours in class + number of hours of home practice): SF-12 PCS: 0.15 SF-12 MCS: 0.43	1. SF-12 PCS: $P > .05$ 1. SF-12 MCS: $P .05$ 2. SF-12 PCS: 95% CI (-0.18 to 0.47); $P = .46$ 2. SF-12 MCS: 95% CI (0.07 to 0.79); $P = .05$	Participants attended 97% of the yoga classes.	Data on adverse effects collected from participants by the yoga instructors at each class and in exit questionnaire; no adverse events reported	Any increase in the yoga breathing practice was correlated with improvements in quality of life
Evans et al (2013)[14]	SF-36 bodily pain (BP) SF-36 vitality SF-36 mental health (MH) SF-36 general health (GH)	Posttreatment 2 mo	Yoga vs control group differences in means at posttreatment: SF-36 BP: 63.3 SF-36 vitality: 56.0 SF-36 MH: 78.8 SF-36 GH: 54.3 2 mo: SF-36 BP: 59.8 SF-36 vitality: 48.5 SF-36 MH: 74.8 SF-36 GH: 54.3	SF-36 BP: Posttreatment, $P > .05$ 2 mo, $P > .05$ SF-36 vitality: Posttreatment, $P < .05$ 2 mo, $P > .05$ SF-36 MH: Posttreatment, $P < .05$ 2 mo, $P > .05$ SF-36 GH: Posttreatment, $P > .05$ 2 mo, $P < .05$	Participants attended 96% of the yoga classes	Participants were asked on a weekly monitoring form to report any adverse events; no adverse events reported	Findings suggest a brief Iyengar yoga intervention is a safe and feasible adjunctive treatment for young people with rheumatoid arthritis, leading to benefits in health-related quality of life
Doulatabad et al (2013)[25]	Multiple sclerosis quality of life-54	4 mo (1-mo post 3-mo intervention period)	Prepost differences in means: Yoga: 4.9 to 7.4 Control: 6.9 to 6.8	Yoga group: $P = .001$ Control group: $P > .05$	No information on compliance or clinical significance	No information on method for assessing or number of adverse events	Yoga group showed a significant improvement in quality of life as compared to the control group
Agarwal et al (2015)[7]	SF-36 subscales: physical functioning role-physical general health vitality social functioning role-emotional mental health bodily pain	Posttreatment (2 mo) 4 mo	Yoga vs control group differences in means over time.	SF-36 physical functioning: $P > .05$ SF-36 role-physical: $P > .05$ SF-36 GH: $P > .05$ SF-36 vitality: $P > .05$ SF-36 social functioning: $P > .05$ SF-36 role-emotional: $P > .05$ SF-36 MH: $P > .05$ SF-36 BP: $P > .05$	Overall yoga session attendance of 89%; average number of sessions attended per participant of 88%; average attendance per session of 83%	No information on method for assessing or number of adverse events	Pilot study showed a high level of feasibility and acceptability and modest effects on measures of quality of life among people living with HIV who use crack cocaine

SF-36 mental component score that correlated with number of hours in yoga class + number of hours of home practice ($P = .05$). However, SF-36 physical component scores were not statistically associated with yoga dose, and no between-group differences in either score were detected.

In the study by Evans et al,[14] rheumatoid arthritis patients on disease modifying antirheumatic medications, nonsteroidal anti-inflammatory drugs, or low-dose corticosteroids were assigned to 90-minute Iyengar yoga classes taught by an experienced teacher and held twice weekly for 6 weeks. The intervention subjects had statistically greater improvements in SF-36 vitality and mental health scores posttreatment, and in general health at 2 months. No between-group differences were detected in bodily pain scores at either time point.

In the study by Doulatabad et al,[25] women with multiple sclerosis were assigned to eight 60- to 90-minute sessions per month for 3 months. The subjects received instruction in Ashtanga yoga, consisting of slow movements and postures (Hatha yoga), breathing exercises (pranayama), and establishment of mental focus and control through meditation, extension and quiescence (Raja yoga). The

intervention subjects improved, on average, from baseline to 1 month postintervention (4.9 to 7.4, $P = .001$) whereas the control group participants did not improve (6.9 to 6.8, $P > .05$).

In the study by Agarwal et al,[7] persons with HIV and histories of crack cocaine use were assigned to two 60-minute yoga sessions for 2 months (16 sessions) taught by a certified yoga instructor. Those in the intervention group had statistically similar improvements, on average, as compared with those in the control group on all SF-36 subscales (physical functioning, role-physical, general health, vitality, social functioning, role-emotional, mental health, and bodily pain) during the 4-month follow-up period ($P > .05$).

According to the authors' conclusions, all 7 studies showed that interventions incorporating yoga were more effective than usual care alone for the improvement of QoL in patients with chronic disease. However, between-group differences were detected statistically on at least 1 QoL outcome in only 5 of the 7 included trials,[6,8,14,25,26] and the clinical significance of the reported differences was clear in only 1 trial.[8]

All EVAT categories scored predominately as adequate (Table 4). The source population and recruitment of participants seemed to be transparently described and reflective of the population from which they were drawn. Many studies described the staff, places, and facilities where treatment occurred, but other studies lacked the details required to fully understand the clinical applicability to real-world settings.

Table 4. Summary of External Validity of the Included Studies

EVAT Criteria	Poorly Covered	Adequately Covered	Well Covered
	Percentage of studies (number of studies)		
Recruitment	0	43% (3)	57% (4)
Participation	29% (2)	0	71% (5)
Model validity	14% (1)	57% (4)	86% (6)

Abbreviation: EVAT, external validity assessment tool.

DISCUSSION

For treatment of most chronic diseases, yoga alone is unlikely to be used as a primary intervention, but yoga appears to hold promise as an adjunctive therapy for patients with chronic disease. Patients with chronic disease who practice yoga may be expected to realize benefits in relaxation, stress reduction, and improved QoL as has been reported for other populations. However, methodological heterogeneity among the included studies inhibited our ability to draw inferences from this review. More research is needed to determine the value of yoga as an adjunctive approach to improving QOL in patients with chronic disease. In particular, it may be valuable to examine how yoga instruction and practice should be adapted to fit the special needs and physical limitations of patients with chronic disease.

Due to issues of heterogeneity and quality, this systematic review was subject to certain limitations. The subject populations of the included studies were heterogeneous with regard to chronic disease diagnosis, distribution by sex, and sample size. In addition, the training, experience, and characteristics of the yoga instructors were not reported in the majority of articles, and in several studies, the yoga protocols were not described with enough detail to inform replication. We also noted heterogeneity among interventions, with treatment periods ranging from 3 days to 3 months, and outcome time points ranging from 1 week to 9 months posttreatment. The quality of included studies was generally low and in many cases did not include enough detail to allow adequate evaluations of generalizability or risk of bias.

CONCLUSION

Among 7 randomized controlled trials included in this systematic review, 5 studies reported a statistically significant advantage over usual care alone for improvement of QOL in patients with chronic disease, but the clinical significance of the differences was clear in only 1 trial. High-quality research is needed to determine the value of yoga as an adjunctive approach to improving QoL in patients with chronic disease.

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AUTHOR DISCLOSURE STATEMENT

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