Review

Yoga as an Adjunct Treatment to Manage Pain, Anxiety, Depression, and Stress During Hospital Stays: A Systematic Review

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Abstract

People frequently report pain, anxiety, depression, and stress during hospital stays. Yoga has been shown to decrease these experiences in various settings. However, it is unclear whether yoga can be implemented during a hospital stay and has positive effects on pain and psychological well-being. The present systematic review aimed to examine the feasibility and impact of yoga interventions on pain, anxiety, depression, and stress when performed by patients during a hospital stay. Using PRISMA guidelines, three databases, and a registry, we conducted a search between August 2021 and December 2022. Both randomized and nonrandomized studies were included. Two authors independently assessed articles and risk of bias. Thirteen studies were included in this review, comprising individuals with a wide age range and various conditions. Three randomized controlled trials, one nonrandomized comparative trial, and nine noncomparative trials were included. Of the five studies reporting on pain (primary outcome), four found a statistically significant reduction. Of the eight studies reporting on anxiety, six found a statistically significant decrease and two reported a nonsignificant decrease in anxiety level. All four studies investigating depression reported a statistically significant decrease. All three studies reporting on stress found a decrease in stress, although only one at a statistically significant level. Five studies reported on the feasibility of performing yoga in a hospital setting, without any negative effects or increase in symptoms. Limited studies have integrated yoga during a hospital stay to address pain and psychological symptoms. Nevertheless, the current evidence suggests that yoga interventions during hospitalization are feasible, and yoga has promising benefits with potential clinically significant reduction in symptoms. Results should be viewed with caution given the lack of randomized trials, low methodological quality, and small sample sizes in the included studies. Further studies are needed to build on this evidence. *Rees et al. Int J Yoga Therapy 2024(34). doi: 10.17761/2024-D-23-00047.*

Keywords: yoga, hospital stay, pain, psychological stress, feasibility

Abbreviations Used

HADS = Hospital Anxiety and Depression Scale
MeSH = medical subject headings
PRISMA = Preferred Reporting Items for Systematic reviews and Meta-Analyses
RCT = randomized controlled trial
RoB = risk of bias
ROBINS-I = RoB in nonrandomized studies of interventions

Introduction

Pain during hospitalization is prevalent among adults[1,2] and children[3] with musculoskeletal and neurological conditions and cancer, postsurgery, and during pregnancy or postpartum. Up to 62% of nonsurgical patients[4] and 80% of surgical patients experience pain during their hospital stay.[5] The severity of pain adversely affects psychological well-being, activity level, and function.[6] Similarly, high anxiety levels are associated with increased pain perception and reduced pain modulation,[7] which can affect the length of hospital stay.[8]

Standard pain-management strategies during hospital stays include pharmacological approaches. These methods do not fully minimize pain levels[9,10] or address psychological stress, and they could facilitate opioid dependency.[11] High levels of pain, opioid

consumption, and psychological stress are also risk factors for the development of chronic postoperative pain.[9,12,13] Given these consequences, opioid-sparing analgesic approaches are evolving with enhanced recovery pathways for postsurgery pain[14]; however, the data supporting specific recommendations continue to evolve. These insights highlight a pressing need for increased pain alternatives and management of psychological stress for patients during hospital stays.

Yoga, as a complementary treatment approach using integrative mind-body practice, is effective in minimizing pain, anxiety, and psychological distress in several chronic conditions.[15–21] Yoga practice includes 8 limbs—restraints, positive habit patterns, voluntary control of breathing *(pranayama),* relaxation and sense withdrawal, concentration, meditation, attaining spiritual knowledge, and physical postures *(asana)*[22]—and works through biological, psychological, and behavioral mechanisms.[23] Therefore, yoga can serve as an adjunct and effective biopsychosocial strategy to impact acute pain and psychological symptoms. Breath-led physical postures have been shown to increase relaxation and reduce pain.[24] Mindfulness meditation and breathing aspects of yoga cause relaxation and reduce pain[25] and anxiety[24] through the central and parasympathetic nervous systems.[26,27] Mindfulness meditation and diaphragmatic breathing also reduce anxiety, leading to reduced pain.[28,29] A 2021 rapid review of systematic reviews suggested favorable outcomes of home yoga and yoga in outpatient settings when compared with usual care for chronic and acute pain.[30]

Although the benefit of yoga on pain and psychological status has been well-documented for chronic conditions, it is unclear whether yoga as an alternative approach can be used to manage acute pain and psychological stress during hospital stays. To the best of our knowledge, no systematic reviews have examined the effects of yoga for the management of acute pain and psychological distress during the hospital stay. The aim of the present systematic review was to investigate yoga as an intervention for acute pain, anxiety, stress, and depression during hospitalization. The feasibility of performing yoga during the hospital stay was also investigated. The results of this review could guide future studies involving yoga intervention as a nonpharmacological option to manage acute symptoms during hospital stays.

Methods

Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines were followed to conduct this review.[31]

Identification of Data Sources

We conducted a literature search from August 31, 2021–December 31, 2022, to gather publications related to the use of yoga during a hospital stay for pain and psychological stress. The following databases were searched to identify articles published between January 1, 1990, and December, 31, 2022: PubMed, Embase, Cochrane Database of Systematic Reviews, and ClinicalTrials.gov. The medical descriptors (medical subject headings, or MeSH) used in the search were: (1) population: "'hospital patient'/exp OR 'hospital patient' OR 'hospitalized patient' OR 'hospitalized patients' OR 'hospitalised patient' OR 'hospitalised patients' OR 'in-hospital patient' OR 'in-hospital patients' OR 'inpatient' OR 'inpatients' OR 'patient, hospital'; and (2) intervention: AND 'yoga'/exp OR 'yoga' combined terms.

The following strategy was used to search Embase:

1. MeSH descriptor "('hospital patient'/exp OR 'hospital patient' OR 'hospitalised patient' OR 'hospitalised patients' OR 'hospitalized patient' OR 'hospitalized patients' OR 'in-hospital patient' OR 'in-hospital patients' OR 'inpatient' OR 'inpatients' OR 'patient, hospital')," yielding 342,142 results; AND
2. ('yoga'/exp OR 'yoga'), with the combined terms yielding 183 results.

The following strategy was used to search PubMed:

1. ((((((hospital[Title/Abstract]) OR (hospitalised[Title/Abstract])) OR (hospitalized[Title/Abstract])) OR (in-hospital[Title/Abstract])) OR (inpatient[Title/Abstract])) OR (inpatients[Title/Abstract])); AND
2. (yoga[Title/Abstract]), with the combined terms yielding 366 results.

The following strategy was used for Cochrane:

1. hospital in Title Abstract Keyword OR hospitalized in Title Abstract Keyword OR in-hospital in Title Abstract Keyword OR inpatient in Title Abstract Keyword; AND
2. yoga in Title Abstract Keyword, with Cochrane Library publication date between January 1990 and December 2022 (word variations were searched).

The following strategy was used for ClinicalTrials.gov:

1. Condition/disease:
2. Other terms: hospital, hospitalized patient, in-patient
3. Intervention/treatment: yoga

Search of the articles was limited to studies reported in the English language. Duplicates were removed. Due to the lack of available studies of yoga intervention during hospitalization, the aim of the present review was to gather all populations/conditions where yoga had been performed for acute symptoms during hospitalization and to systematically report outcomes on pain, anxiety, stress, depression, length of hospital stay, and feasibility of yoga intervention.

Inclusion criteria included any patient over the age of 5 who received yoga, modified yoga, or components of a yoga intervention during their hospital stay; both randomized and nonrandomized studies were included. Exclusion criteria were: (1) studies that used only meditation, breathing, and/or mindfulness without a physical component; (2) studies seeking to

show long-term benefits with no specific reporting on changes in acute symptoms during the hospital stay; (3) case studies and posters; and (4) yoga interventions in psychiatric hospitals. The studies performed in psychiatric hospitals did not report on pain, which was the primary outcome of interest of the present systematic review. We did not include any papers that had not been translated to English. Studies that did not use an outcome of interest listed below were excluded.

The primary outcome was pain intensity measured with a 0–10 visual analog scale, with 0 being no pain and 10 being the worst pain imaginable.

Secondary outcomes included

- anxiety,
- depression,
- stress,
- length of stay, and
- feasibility.

Selection of Studies

Titles and abstracts of studies found in the initial search were independently reviewed by two of the authors, and duplicates were removed. The full text of the papers selected as potentially relevant based on the study criteria and search strategies were retrieved and analyzed independently by the two authors. The authors then compared their lists of studies that they believed met the study criteria. Results from both authors were compared, and any disagreements were resolved by discussion and consensus.

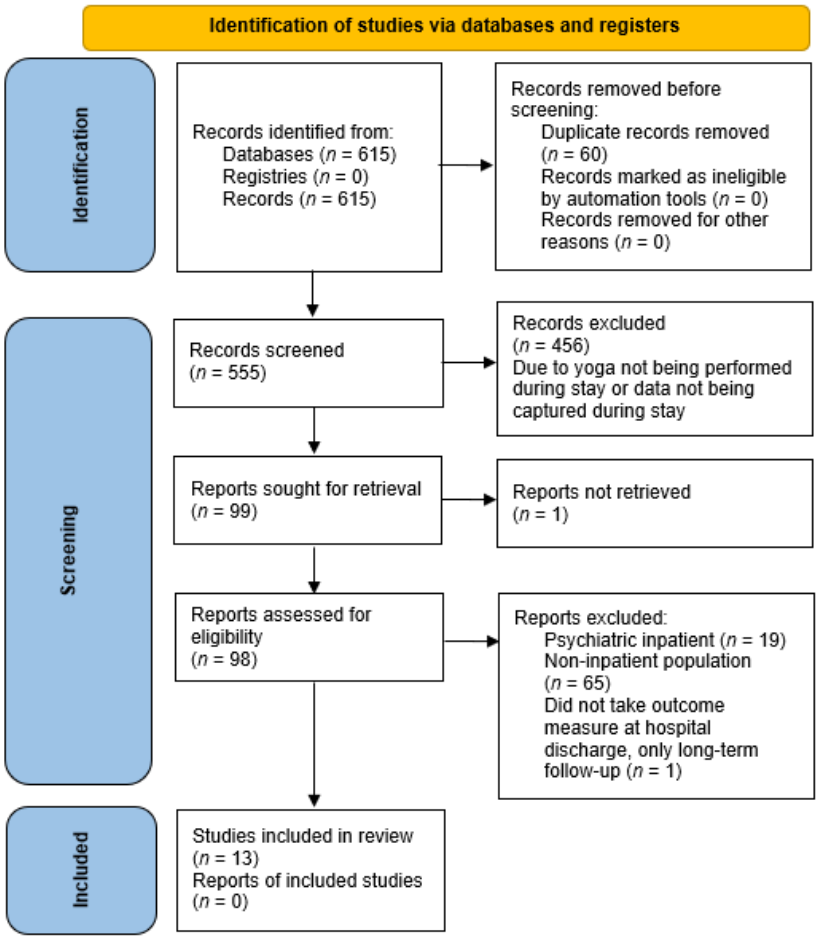
Assessment of Risk of Bias

Both authors independently assessed the risk of bias (RoB; quality of the studies) of each included study using three tools: (1) RoB for randomized trials[32]; (2) RoB in nonrandomized studies of interventions (ROBINS-I)[33]; and (3) Newcastle-Ottawa Scale for noncomparative studies.[34]

Results

Figure 1 outlines the search results. The initial search resulted in a total of 615 articles for consideration. Two coauthors divided the articles and examined the titles. Sixty articles were excluded due to duplicate records, and 456 were excluded primarily due to not performing yoga at all or not performing yoga during the hospital stay, resulting in the exclusion of 516 articles total. The remaining 99 articles were sought for retrieval, but we could not retrieve one of these articles. The remaining 98 articles were screened for eligibility by reading their abstracts. According to the established eligibility criteria, 85 articles were removed, resulting in a total of 13 papers included in the present systematic review.

Figure 1. PRISMA Flow Diagram[31]



Next, the articles were reviewed for RoB. Out of 13 articles, three randomized controlled trials (RCT) were graded using RoB 2.0,[32] and one nonrandomized comparison was assessed utilizing the ROBINS-I.[33] All remaining studies were noncomparative and thus assessed using the Newcastle-Ottawa Scale.[34] Results from the two authors were compared, and any disagreements were resolved by discussion and consensus.

Quality Review

The quality of review of all studies is outlined in Tables 1–3.

Of the three RCTs, two studies were ranked to have high risk of bias,[35,36] and one was ranked to have some concerns for bias.[37] Due to the nature of yoga investigations, it is not feasible to fully blind participants as to whether they are receiving yoga. Therefore, RCTs implementing yoga will carry some risk of bias (Table 1).

The risk of bias found in one nonrandomized paper with two groups[38] was moderate, meaning "the study provides sound evidence for a nonrandomized study but cannot be considered comparable to a well-performed randomized trial"[33] (Table 2).

The primary concern for all nine noncomparative studies was lack of representativeness throughout the intervention cohorts, according to the Newcastle-Ottawa Scale.[34] The selected group of patients was either from the same area/socioeconomic group, etc., or no description of the derivation of the cohort was provided (Table 3).

Table 1. Risk of Bias (RoB) 2.0 Scale for Randomized Controlled Trials

Study	Experimental	Comparator	Outcome	Weight	D1	DS	D2	D3	D4	D5	Overall
Gallagher et al.[35]	Yoga	No yoga	Anxiety, depression	1	High	NA	Some concerns	High	High	Low	High
Krese et al.[36]	Yoga	Conventional physical therapy and seated rest	Sleep, anxiety, fatigue, heart rate variability	1	High	Low	Low	Low	Low	Low	High
Moody et al.[37]	Yoga	Relaxation control	FACES pain score, anxiety	1	Low	NA	Some concerns	Low	Low	Low	Some concerns

D1 = randomization; DS = domain S, risk of bias arising from period and carryover effects; D2 = deviations from intended interventions; D3 = missing outcome data; D4 = measurement of the outcome; D5 = selection of the reported result.

Table 2. Risk of Bias in Nonrandomized Studies of Interventions (ROBINS-I)

Study	Study Design	Risk of Confounding	Selection Bias	Classification Bias	Bias Due to Deviation from Intervention	Bias Due to Missing Data	Bias in Outcome Measurement	Bias in Selection of Reported Results	Overall Risk of Bias
Chalageri et al.[38]	Low	Low	Serious risk of bias	Low	Serious risk of bias	Low	Moderate	Low	Moderate

Table 3. Risk of Bias, Newcastle-Ottawa Scale*

Study	Representativeness of the Intervention Cohort	Selection of the Nonintervention Cohort	Ascertainment of Intervention	Demonstration that Outcome of Interest Was Not Present at Start of Study	Comparability of Cohorts on the Basis of the Design or Analysis	Assessment of Outcome	Was Follow-up Long Enough for Outcomes to Occur?	Adequacy of Follow-up center
Chobe et al.[39]	b	c	a	a	No	c	b	c
Curtis et al.[40]	b	c	a	a	No	c	b	c
Dangel et al.[41]	d	d	a	a	No	c	b	b
Diorio et al.[42]	c	c	a	a	No	c	b	a
Geyer et al.[4]	c	c	a	a	No	c	b	a
Jenefer Jerrin et al.[16]	c	c	a	a	No	c	b	a
Mascaro et al.[44]	c	c	a	a	No	c	b	a
Sohl et al.[45]	c	c	a	a	No	c	b	a
Thygeson et al.[46]	c	c	a	a	No	c	b	a

*Each letter indicates a different level of risk based on individual factors; however, in general, *a* denotes high quality, whereas *d* denotes that either no description was provided or the description was of poor quality. Refer to the Newcastle-Ottawa Scale[34] for additional information.

Nine of the 13 studies did not have a comparator group, so blinding was not possible. One RCT with comparators used a crossover design intervention/comparator, where the intervention was performed in a randomized order.[36] One RCT with high-risk mothers on bedrest compared yoga + standard hospital care to standard hospital care only (control). Blinding was not mentioned in that paper, and the principal investigator was the yoga instructor, leading to possible increases in the risk of bias.[35] The final RCT reported that the list of treatment assignments (yoga compared to control conditions) was kept concealed until after the participant consented to avoid bias.[37] That study also used a research assistant to administer pre- and postintervention scales, and that person was blinded as to which group the participant was assigned to. The nonrandomized comparative study's authors did not report on how they decreased the risk from lack of blinding other than by having data collected by a physiotherapist who was not involved with recruitment or statistical analysis.[38]

Level of Evidence

Nine out of the 13 studies were noncomparative trials.[16,39–46] One study was comparative trial between conventional rehabilitation and conventional rehabilitation + raja yoga; however, the groups were nonrandomized.[38] Three studies were RCTs[35–37]; one of these compared yoga to standard care for mothers on bedrest.[35] One RCT compared yoga to time-matched quiet rest, and both the yoga and control groups had the same serene CD playing.[37] One RCT compared standard care physical therapy on Day 1, yoga on Day 2, and seated rest on Day 3 in a crossover design.[36] No studies reported long-term follow-up. Eight studies were performed with a sample size of less than 20.[36,39,41–43,45,46] One study[41] used a nonvalidated questionnaire to determine the benefits of yoga during the hospital stay (Table 2).

Outcome Measures

Outcome measures are shown in Table 4.

Pain

Five studies reported the effects of yoga on pain,[37,38,40,44,45] with four reporting a statistically significant reduction in pain and one reporting nonstatistically significant improvement in pain.[16]

A study by Moody et al.[37] performed a single yoga session using a specific and repeatable protocol that emphasized mindfulness, asana, breathing, and relaxation for children with sickle-cell disease. Segment 1 of the session included mindfulness, where the participant became aware of their breath. Segment 2, "asanas," comprised all supine poses using props or instructor-given traction, resembling a restorative practice. Segment 3, "pranayama and valoma [viloma I] (lengthening and regulation of the breath)," included guided relaxation with counting, noticing bodily sensations, and progressive guided relaxation.

Table 4. Outcome Measures

					Outcomes				
Study Type	**Author/ Year**	**Title**	***n***	**Population + Intervention**	**Pain**	**Anxiety**	**Depression**	**Stress**	**Feasibility**
RCT	Gallagher et al. (2020)[35]	Effects of Yoga on Anxiety and Depression for High Risk Mothers on Hospital Bedrest	*n* = 48 intervention *n* = 31 control	**Population:** Pregnant women aged 30.44 ± 6.17 on bedrest **Intervention:** Intervention group received 30 min of individually led yoga sessions with a trained yoga instructor 2×/week in their room for the duration of their time they were in the hospital stay; intervention group also had access to on-demand yoga videos The control group received standard care Prior to the day of discharge all patients completed HADS		Anxiety based on HADS: significantly lower in intervention group (intervention group = 5.88, control group = 9.03, p = 0.001)	Depression based on HADS: significantly lower in intervention group (intervention group = 3.33, control group = 6.06, p = 0.001)		

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Table 4. *continued*

					Outcomes				
Study Type	**Author/ Year**	**Title**	***n***	**Population + Intervention**	**Pain**	**Anxiety**	**Depression**	**Stress**	**Feasibility**
RCT	Krese et al. (2020)[36]	The Impact of a Yoga-Based Physical Therapy Group for Individuals with Traumatic Brain Injury: Results from a Pilot Study	*n* = 13 crossover study	**Population:** People aged 45.31 ± 14.23 with traumatic brain injury **Intervention:** In randomized order, patients in this crossover study participated in yoga-based physical therapy, conventional physical therapy, or seated rest HRV and self-reported anxiety and fatigue were measured immediately before and after each session		Anxiety based on STAI two subsections; STAI absent and STAI present showed no statistically significant difference between treatment groups			
RCT	Moody et al. (2017)[37]	A Randomized Trial of Yoga for Children Hospitalized with Sickle Cell Vaso-Occlusive Crisis	*n* = 35 intervention & *n* = 35 control	**Population:** Children with sickle cell disease with a mean age of 15 **Intervention:** Patients began intervention or control group 24 hours after hospital admission Patients in the yoga group were provided with daily 30-min yoga sessions in their rooms Monday–Friday; during the first two yoga sessions, the CD "Morning in the Mountains" was played for a more serene environment The control condition matched the yoga group for time, attention, and ambiance by playing the same CD, although no yoga was performed	Pain using Wong-Baker FACES pain rating for children was significantly lower in the yoga arm after the first yoga session: (yoga arm = −0.6 ± 0.96, control arm = 0.0 ± 1.37, p = 0.029); no statistically significant difference was found following yoga sessions	Anxiety based on STAI showed no statistically significant difference			
CNR	Chalageri et al. (2021)[38]	Effect of Rāja Yoga Meditation on Psychological and Functional Outcomes in Spinal Cord Injury Patients	*n* = 46 intervention & *n* = 45 control	**Population:** People aged 31.19 ± 10.36 diagnosed with spinal cord injury	Numeric pain rating significantly lowered in yoga group (p < 0.001)	Anxiety using HADS significantly lowered in yoga group (p < 0.001)	Depression using HADS significantly lowered in yoga group (p < 0.001)	Stress using the PSS significantly lowered in yoga group (p < 0.001)	

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Table 4. *continued*

					Outcomes				
Study Type	**Author/ Year**	**Title**	***n***	**Population + Intervention**	**Pain**	**Anxiety**	**Depression**	**Stress**	**Feasibility**
				Intervention: Patients were placed in an intervention group (easy raja yoga + conventional rehabilitation) or control group Patients in the yoga group received easy raja yoga for 1 month, along with conventional rehabilitation Patients in the control group received only conventional rehabilitation					
NC	Chobe et al. (2016)[39]	Effect of Integrated Yoga and Physical Therapy on Audiovisual Reaction Time, Anxiety and Depression in Patients with Chronic Multiple Sclerosis: A Pilot Study	*n* = 11	**Population:** People aged 55.45 ± 10.02 diagnosed with MS, all with Extended Disability Status Scale scores < 7 **Intervention:** Patients received integrated yoga and physical therapy for 3 weeks; yoga postures, breathing, and mediations, along with physical therapy, were performed 5 days/week for 5 hours/day total; participants were assessed before and after intervention		Anxiety using HADS significantly decreased ($p = 0.02$)	Depression using HADS significantly decreased ($p = 0.04$)		
NC	Curtis et al. (2016)[40]	Evaluation of a Specialized Yoga Program for Persons Admitted to a Complex Continuing Care Hospital: A Pilot Study	*n* = 10	**Population:** People aged 63.1 ± 16.6 with varying diagnoses (MS, end-stage renal disease, Klippel-Feil syndrome, superficial injury, cervical spondylosis, intracranial hemorrhage, kyperkalemia, neuromuscular bladder dysfunction, syncope, neuromyelitis optica/Devic's disease)	Pain using Brief Pain Inventory Short Form showed no significant change	Anxiety using HADS showed a significant main effect of time ($p \leq 0.05$)		Stress using PSS showed no significant change	

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Table 4. *continued*

					Outcomes				
Study Type	**Author/ Year**	**Title**	***n***	**Population + Intervention**	**Pain**	**Anxiety**	**Depression**	**Stress**	**Feasibility**
				Intervention: In a repeated-measures design, patients in a complex continuing care hospital participated in a 50- to 60-minute yoga class once/week for 8 weeks with homework practice					
NC	Dangel et al. (2020)[41]	Inpatient Prenatal Yoga Sessions for Women with High-Risk Pregnancies: A Feasibility Study	*n* = 15	**Population:** Women aged 32.8 ± 6.5 with high-risk pregnancies **Intervention:** Inpatient prenatal yoga program; yoga sessions lasted for 30 min and were offered weekly				Stress reduction as measure by a nonvalidated questionnaire: 8 participants responded, all indicating stress reduction post-class	Feasibility: 15/39 participated
NC	Diorio et al. (2015)[42]	A Pilot Study to Evaluate the Feasibility of Individualized Yoga for Inpatient Children Receiving Intensive Chemotherapy	*n* = 11	**Population:** Children and adolescents aged 7–18 diagnosed with leukemia **Intervention:** Yoga was conducted 3×/week for 3 weeks in children receiving chemotherapy or hematopoietic stem cell transplantation					Feasibility, defined as ability to deliver ≥ 60% of planned sessions: 10/11
NC	Geyer et al. (2011)[43]	Feasibility Study: The Effect of Therapeutic Yoga on Quality of Life in Children Hospitalized with Cancer	*n* = 6	**Population:** Children aged 5–19 with varying cancer diagnoses **Intervention:** Six children participated in 5 yoga sessions over 2 months; children and families who chose to participate in the yoga study filled out a PedsQL 4.0 quality of life survey before the initial yoga session and again after 5 Bendy Kids Yoga sessions					Feasibility: 256 children participated in the Bendy Kids Yoga program; only 6 children and 4 caregivers participated in this study due to children being discharged prior to 5 weekly classes, or children being too medically fragile
NC	Jenefer Jerrin et al. (2021)[16]	Yoga and Naturopathy Intervention for Reducing Anxiety and Depression of Covid-19 Patients—A Pilot Study	*n* = 30	**Population:** COVID-19-positive people with a mean age of 44 admitted to a tertiary-care hospital **Intervention:** Participants were given yoga 60 min/day for 2 weeks		Anxiety based on HADS: significantly lower after intervention ($p = 0.05$); anxiety based on Coronavirus Anxiety Scale: significantly lower after intervention ($p = 0.01$)	Depression based on HADS: significantly lower after intervention ($p = 0.04$)		

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Table 4. *continued*

					Outcomes				
Study Type	**Author/ Year**	**Title**	***n***	**Population + Intervention**	**Pain**	**Anxiety**	**Depression**	**Stress**	**Feasibility**
NC	Mascaro et al. (2019)[44]	Individualized, Single Session Yoga Therapy to Reduce Physical and Emotional Symptoms in Hospitalized Hematological Cancer Patients	*n* = 486	**Population:** Hospitalized people with hematological cancer; 6% aged < 25, 30% aged 26–50, 64% aged > 50 **Intervention:** Participants were provided a 40-min individualized yoga therapy session; patient symptoms were recorded before and after class; no sessions were stopped early due to patient pain	Pain: using a 0–4 Likert-type scale, changed from a mean of 0.98 pre-session to 0.65 post-session (p = 0.0001)				Feasibility: 87% of yoga classes attempted were completed (486/558)
NC	Sohl et al. (2016)[45]	Feasibility of a Brief Yoga Intervention for Improving Acute Pain and Distress Post Gynecologic Surgery	*n* = 7	**Population:** Women aged 54.7 ± 8.7 scheduled for exploratory gynecological surgery **Intervention:** Participants were given three 15-minute yoga skills training classes, one prior to surgery and two postsurgery; immediate effects of the yoga skills training were recorded	Pain using visual analogue scale ratings immediately before and after each session (d = −0.67 to −0.95)				Feasibility: 63% for presurgery and 88% for postsurgery
NC	Thygeson et al. (2010)[46]	Peaceful Play Yoga: Serenity and Balance for Children with Cancer and Their Parents	*n* = 16	**Population:** Children aged 6–18 with a cancer diagnosis **Intervention:** On an inpatient hematology/oncology unit, 11 children aged 6–12 years, 5 adolescents aged 13–18 years, and 33 parents participated in a single yoga session tailored to their needs and abilities; sense of well-being pre- and post-class was measured with the Spielberger STAI Children had normal anxiety scores pre-class that did not change; adolescents and parents experienced significant decreases in anxiety scores, and all cohorts gave positive feedback about the experience		Anxiety using STAI: The adult version of the STAI was used for the adolescent and parent cohorts; adolescents (n = 5) experienced a significant decrease in anxiety, with their median STAI score decreasing from 41 to 28 (p = 0.04); STAI-C was used for the child cohort and showed no change pre to post			

CNR = comparative nonrandomized; HADS = Hospital Anxiety and Depression Scale; HRV = heart rate variability; MS = multiple sclerosis; NC = noncontrolled; PSS = Perceived Stress Scale; RCT = randomized control trial; STAI = State-Trait Anxiety Inventory.

A study by Chalageri et al.[38] was a nonrandomized comparative trial conducted in a tertiary-care center on patients with spinal-cord injuries, in which raja yoga + conventional care was compared to conventional care only for 1 month. Yoga was instructed by a "qualified easy raja teacher." Although the specific protocols were not reported, the intervention followed tenets of raja yoga. These are reported as (1) peace and positivity, (2) understanding universal flow (which encourages self-empowerment), and (3) the universal being is a source of positive energy.[38] Patients with acute pain were separated from patients with chronic pain. Patients with acute pain showed greater reduction in pain (4.7 pre, 0.8 post; $n = 23$) compared to the patients with chronic pain (4.8 pre, 1.6 post; $n = 23$). The change in pain rating following the intervention was statistically and clinically significant for both groups.

Sohl et al.[45] showed a significant decrease in pain after surgical intervention. The authors used a previously developed protocol for "yoga skills training" of meditation, movement, breathing, and relaxation.[47,48] The sessions were adapted to be taught in bed by a registered yoga teacher with specific cancer training (Integral Yoga Academy's Yoga Therapy in Cancer and Chronic Illness Training).

A study by Mascaro et al.[44] used yoga therapy for cancer and a chronic illness protocol[48] that included "body awareness, breath awareness, active movement, and relaxation imagery practice."[44] Participants performed yoga reclined in bed or in a chair, often with family members/caretakers participating. The yoga therapist was certified by the International Association of Yoga Therapists (IAYT).

Curtis et al.[40] used a hatha yoga intervention. Ten participants attended, eight participated in the second timepoint of questionnaires, and only six completed the last timepoint of questionnaires. The classes were broken into one-third postures, one-third relaxation, and one-third yoga philosophy, all performed in a seated position. Yoga instructor information was not reported. There was some reduction in pain-catastrophizing thoughts from pre- to postintervention. Pain-catastrophizing beliefs lead to increased pain severity[49] and as such could be an important outcome measure to add to future yoga studies.

These studies demonstrated potentially immediate effects of yoga intervention on pain reduction that was also clinically significant.[38,44,45]

Anxiety

Eight studies reported on anxiety.[16,35–40,46] Six found a significant decrease in anxiety,[16,35,38–40,46] and two RCTs found a nonstatistically significant decrease in anxiety.[36,37] The first RCT[37] used 30-minute one-to-one yoga classes in the participant's hospital room Monday through Friday. A nature-sounds CD was played for the duration of the class. The same CD was played for the control group, with the option of having the yoga instruction in their room. All 35 participants in the yoga group received one session; 25 received two sessions; 12 received three sessions; 10 received four sessions; and 4 received five sessions. The control group had a similar number of sessions. The wide variability in the intervention delivery may have resulted in nonsignificant positive effects on decreasing anxiety. The study also reported a statistically significant decrease in pain in the yoga group.

In the second RCT all participants were 18 or older and had a diagnosis of traumatic brain injury.[36] Yoga was performed in a group with 2–5 patients, and classes lasted approximately 54–57 minutes. Patients had 1 day of conventional physical therapy, followed by 1 day of yoga-based physical therapy, followed by 1 day of seated rest. One day of yoga physical therapy may not have been enough to significantly lower anxiety levels. The authors proposed that the nature of the intervention, provided in seated rest with no reciprocal verbal or nonverbal communication to minimize stimulation, could have contributed to the nonsignificance of improvement in anxiety scores.

Depression

Four studies reported on depression[16,35,38,39] using the Hospital Anxiety and Depression Scale (HADS). All four reported a significant decrease in patients' HADS depression scores. One of the four was an RCT with participants who were high-risk mothers on bedrest.[35] This group participated in yoga for 30 minutes a day, 2 times a week. That study also reported a significant decrease in anxiety scores. One study included participants with spinal-cord injuries who performed yoga for 1 month,[38] also reporting a significant reduction in pain rating. One study had patients with COVID-19 performing yoga for 60 minutes per day for 2 weeks.[16] The final study included adults with chronic multiple sclerosis, who performed yoga with physical therapy for 5 hours a day, 5 days a week.[39] The study also reported a significant decrease in anxiety scores.

Stress

Three studies reported on stress,[38,40,41] with two reporting significant reduction in stress[42,44] and one reporting nonsignificant reduction in stress in the yoga group.[16,] Of the two reporting significant reductions, one included people with spinal-cord injuries.[38] That study also reported significant reductions in depression, anxiety, and pain (both statistically and clinically significant improvement).

The second study, which sought to determine feasibility, used a nonvalidated questionnaire on women with high-risk pregnancies to determine their stress level.[41] All eight participants reported reduction in stress level postintervention. Six patients participated in one yoga session, and two participated in two–five yoga sessions. All eight participants reported "yes" when the survey asked, "Did you find that yoga helped with stress level?" The participants provided additional insight to yoga dosing, with 50% stating that 30 minutes was the best duration for a yoga session and 37% saying that 45 minutes was the best duration. All participants also reported that they would recommend yoga to someone who was hospitalized during pregnancy, adding to the feasibility of the study.

The third study reported a nonsignificant reduction in stress and included an overall sample of 10 individuals requiring hospitalization and complex continuing care and did not have a control group.[40] The patients were given a yoga class once a week for 8 weeks.

Length of Stay

Only one RCT explored the length of hospital stay, reporting no significant difference between the yoga and non-yoga groups.[37] Both groups had mean stays 5 days. However, there was a significant decrease in pain and nonsignificant reduction in the amount of IV morphine used in the yoga group.

Feasibility

Given the lack of studies related to yoga intervention during hospital stays and the pilot nature of the reported studies, we also examined the feasibility of the implementation of yoga. Only five studies reported on the feasibility of performing yoga.[41–43,44,45] Dangel et al.[41] reported that of the 39 high-risk pregnant participants who were deemed eligible for yoga participation, 15 were able to participate, a 38% recruitment rate. The authors defined feasibility as being able to deliver at least 60% of planned sessions and ultimately had 10 out of 11 participants able to meet this requirement.[42] That study showed the potential feasibility of yoga intervention even for high-risk pregnant participants. Geyer et al.[43] reported that it was feasible for six children to participate in at least 5 sessions over 2 months of hospitalization. Mascaro et al.[44] reported that 486 of 558 yoga classes attempted were completed in patients hospitalized with hematological cancer. Sohl et al.[45] reported 63% completion in yoga classes pre–gynecological surgery and 88% completion in classes post–gynecological surgery.

Discussion

Thirteen articles met the study criteria. Only three were RCTs, with one study using a crossover design. The remaining studies were single-arm studies. There was wide variability in the duration and frequency of yoga intervention and in the type of yoga intervention. Overall, the results of the present systematic review indicate that yoga may have a positive effect on pain, anxiety, depression, and stress in the hospital setting. The results also indicate that it is feasible to implement yoga interventions during hospital stays for individuals with a wide range of ages and a variety of conditions, with no adverse effects reported. However, given the limited number of studies and lack of RCTs, the evidence is insufficient to fully assess the impact of yoga on acute pain, anxiety, depression, stress, or length of hospital stay, or on the feasibility of implementing yoga interventions during hospital stays. The findings must be considered with caution given their low methodological quality and the small samples in the studies reported in this systematic review. Thus, significant knowledge gaps about the feasibility and effects of yoga interventions during hospital stays remain.

Pain

Yoga can be an effective and safe practice to control chronic and acute pain, particularly related to musculoskeletal conditions,[50] such as low -back and neck pain.[30] Given the limited number of studies examining pain outcomes included in this systematic review, drawing a clear comparison with prior studies is difficult. However, the collective findings of five diverse studies suggest positive effects of yoga on pain ratings in the hospital setting.[21,30,50,51] These findings are consistent with previous studies in nonhospital populations.[30,50] A variety of pain scales were used to assess pain. It is important to note that none of the papers reported an increase in pain from yoga practice, suggesting that yoga may be safely implemented in the hospital setting to decrease pain levels in adults and children with a variety of conditions. Yoga's ability to decrease pain aligns with previous systematic reviews examining pain in other settings.[17,52,53]

Although significant improvement in pain was reported by the studies performed in the hospital setting, the findings should be considered with caution given the small sample sizes. These preliminary reports should be confirmed with a larger sample size in RCTs. Long-term follow-up studies are also needed to analyze the effect of yoga intervention delivered during the hospital stay on pain after hospital discharge, as well as adherence to recommended home yoga programs for long-term pain management.

Dosing of the yoga interventions varied greatly. Some studies included many yoga sessions daily, whereas one, for example, included a single yoga session. The length of classes ranged from 15 minutes to 1 hour. Collectively, these findings suggest that even some amount of yoga may be beneficial for certain populations and that more frequency and/or duration of yoga may be needed to impact pain for people with neurological conditions. With variable amounts of yoga and variable results for pain, the effective dosage is another avenue to pursue in future studies.

Psychological Well-Being (Anxiety, Depression, Stress)

The current review considered findings from nine diverse studies that reported a measure of anxiety, depression, and/or stress and suggested a positive effect of yoga on psychological well-being.[16,35–41,46] The primary measure to assess anxiety and depression was the HADS,[54] whereas the Perceived Stress Scale was used to measure stress.[55] The findings are consistent with previous studies. A prior study reported a moderate effect of yoga on depression when performed outside of the hospital setting.[56] A 2017 systematic review found that yoga had comparable effects to exercise and medication for treating depression.[57] A 2018 systematic review investigating yoga and anxiety disorders showed that yoga might be beneficial in the short term for reducing the intensity of anxiety.[58] A 2016 systematic review reported that yoga could reduce low back pain and disability.[59] A 2020 systematic review found that most types of yoga had a positive effect on stress, although its effect was only evaluated in healthy populations.[60] Collectively, these systematic reviews indicate that

yoga is effective for managing psychological symptoms for a variety of conditions and thus should be considered to manage stress during hospitalization, particularly as treatment options to manage psychological stress during hospitalization can be limited. Again, due to small sample sizes and lack of RCTs, the results should be considered with caution and additional confirmation studies undertaken.

The exact mechanisms of how yoga modulates pain and mitigates psychological stress are not fully understood and likely multifactorial. Studies suggest that the mind-body interplay of yoga practice can affect brain function and brain networks, which likely modulates pain via descending pain inhibition and cognitive control over psychological stress and emotion through cortical regions such as the dorsolateral prefrontal cortex.[61] The mind-body connection emphasized through yoga's physical and psychological practices is potentially applicable for the management of pain and psychological stress in a variety of patient populations during hospital stays. Within the hospital environment, considering the patient's illness and associated symptoms, a comprehensive biopsychosocial care model using complementary and integrative medicine such as yoga could potentially reduce pain and stress.

Considerations for Clinical Practice

Revised guidelines published by the U.S. Centers for Disease Control and Prevention in 2022 endorsed a preference for nonopioid treatments and multimodal approaches for managing acute and chronic pain.[62] Multimodal management could include low-risk, safe nonpharmacological approaches, such as yoga, as part of a comprehensive and biopsychosocial care approach to manage acute symptoms of pain and psychological stress and to facilitate function during hospital stays.

Based on the varying body positions and types of yoga performed, it is reasonable to conclude that modified positions included, such as seated or supine, are appropriate for in-hospital yoga interventions. All studies used some form of experienced yoga instructor, and it is recommended that this factor, as well as previous experience working with individuals with chronic pain and medical complexity, be considered.

Sohl et al.[45] used 15-minute sessions, which would allow integration of other interventions in a clinical setting as a part of a multimodal approach. Three studies that reported significant reduction in pain also provided insight into their yoga protocols.[37,44,56] These studies included some form of breath awareness and regulation, as well as active movement. These seem to be necessary components for a successful yoga intervention. Body awareness,[37] progressive relaxation,[37] and relaxation imagery practice are also important for pain reduction.[44] Additionally, patient perspectives may be necessary to design appropriate yoga interventions, as 50% of hospitalized mothers stated that 30 minutes/yoga session was the best duration and 37% said 45 minutes was the best.[41] Consideration of medical condition, patient fatigue level, comorbidities, patient perspective, and the objective of the yoga intervention are important factors to consider. Yoga interventions may be different for those with a neurological condition or musculoskeletal condition or people undergoing a surgery unless they are specifically tailored to these concerns.

Future Directions

The present systematic review was initially aimed to subgroup populations by conditions. However, this was not possible due to the limited number of papers using yoga interventions during the hospital stay. The conditions included traumatic brain injury, sickle-cell disease, spinal-cord injury, children receiving chemotherapy, high-risk pregnancy, COVID-19, hematological cancer, gynecological surgery, and children with cancer and their parents. No studies included musculoskeletal disorders as a patient population, despite such disorders being the leading cause of hospitalization according to the Agency for Healthcare Research and Quality.[63] Future studies should aim to examine patient conditions associated with pain, anxiety, and depression, to include musculoskeletal conditions, with larger sample sizes.

Finally, a major gap in assessing the feasibility of yoga intervention during the hospital stay exists. A comprehensive assessment of feasibility should be determined prior to determining the efficacy of yoga. This should include all measures of feasibility, such as recruitment and retention rates, participants' willingness to be randomized, dropouts, adherence to and deviations from the study protocol or yoga intervention, implementation of planned assessment and participant burden to complete planned assessments, dropouts due to assessment or intervention burden, and safety measures. Future studies should consider these feasibility measures when piloting yoga interventions during the hospital stay, while considering acute symptoms and the novelty of yoga use during hospitalization.

Limitations

The present study has several limitations. First, a small number of eligible trials, even with the inclusion of nonrandomized studies, limited the level of evidence to low. Studies conducted in psychiatric facilities were excluded from this review. The addition of those articles would have increased the volume of studies included. However, many of the outcome measures used in the psychiatric hospital setting were not applicable to the objective and outcomes related to this systematic review. Not including non–English language papers further limited the pool of available studies. Nevertheless, the inclusion of nonrandomized trials allowed increased volume and assessment of potential yoga effects for the common acute symptoms of pain and psychological stress during hospital stays. The lack of search terms for "acute" and "acute rehabilitation" may also have limited the overall number of studies included. These terms are commonly used in a hospital setting and could have added depth to the volume of studies reviewed. Additionally, blinding of assessors was not explained in many of the included studies, potentially causing bias in results and study interpretation.

Specific yoga protocols used in research are usually not explicitly written as a part of research manuscripts. This may be due to tailoring of yoga classes to fit the individual needs of those participating but constitutes a large limitation when trying to move forward with selecting yoga protocols for future studies. The expertise of the yoga instructor was also not always reported on, which likely added to the variability in intervention delivery and overall effects.

Lastly, children and adults were included in this review. The studies including children had populations aged up to 18 years old[42] and 21 years old.[37] Two papers that included children also included parent-reported personal outcomes.[43,46] These four studies would potentially include results that are generalizable to other adult populations. Overall, the variance in age range, diagnosis, and yoga intervention limit the results of the present study. However, the positive results with heterogeneity of the studies serve as a promising foundation for future research.

Conclusions

Based on this first systematic review specific to the acute-care setting, it could be beneficial to consider yoga intervention for acute symptoms during a patient's hospital stay. No study reported worsening of symptoms or negative effects. However, whether yoga intervention has a significant impact on the outcomes of interest remains unclear given the lack of RCTs. Additional studies are needed to evaluate whether yoga affects common acute symptoms and if so, to what degree. Because of the lack of long-term follow-up, we cannot determine if there is long-term benefit. The results of this study and the overall feasibility findings can guide future studies in including yoga as an intervention while patients are undergoing a hospital stay.

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Conflict-of-Interest Statement

There are no financial relationships, patents, copyrights, or royalties relevant to the submitted work.

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