Practical Application of Yoga-based Techniques in the Treatment of Chronic Pain

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Learning Objectives

After this presentation, the audience will:

• List and define the different aspects of yoga
• Explain the scientific rationale behind yoga-based techniques (YBT) as part of a comprehensive treatment of the patient with chronic pain
• Describe the neuro-physiological changes in the condition of chronic pain
• Identify current evidence regarding yoga and its efficacy in the treatment of chronic pain.
Learning Objectives

• Demonstrate understanding of how to perform and teach 3 breathing/relaxation techniques
• Understand how to integrate YBT strategies in the treatment of the patient with chronic pain
Presentation Overview

• Pain overview
• Yoga definitions
• Brief yoga history
• Aspects/8 limbs of yoga
• Integration with PT
• Research: the yoga of awareness
• Practice of YBT (awareness, breath, asanas)
The Patient with Chronic Pain

A (Very!) Brief Overview
• Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research

• Released:
  • June 29, 2011

• Board:
  • Board on Health Sciences Policy
Pain Statistics (IOM, 2011)

- Chronic pain affects an estimated 116 million American adults—which is more than the total affected by heart disease, diabetes, and cancer combined.
- Chronic pain costs the nation $560-$635 billion each year in medical treatment and lost productivity.
Conclusion:

• “Pain is a major driver for visits to physicians, a major reason for taking medications, a major cause of disability, and a key factor in quality of life and productivity. Given the burden of pain in human lives, dollars, and social consequences, relieving pain should be a national priority.”
Recommendations-IOM report on Pain(2011)

• Because pain varies from patient to patient, healthcare providers should increasingly aim at tailoring pain care to each person’s experience

• Self-management of pain should be promoted

• PCP should collaborate with pain specialists in cases where pain persists

• Insurers to offer incentives to support PCP to deliver coordinated, EB, interdisciplinary pain assessment and care for persons with complex pain
Pain Defined

• An unpleasant sensory and emotional experience associated with actual or potential tissue damage.
• Simple: A warning mechanism that helps protect an organism by influencing it to withdraw from harmful stimuli.
• Complex: in case of chronic pain, changes in the CNS and accompanied by depression or anxiety
Chronic Pain

- Ongoing or recurrent pain lasting beyond the usual course of acute illness or injury
- Generally more than 3-6 months and adversely affecting the individual’s well-being
Chronic Pain: nervous system changes

- Sensitization of nociceptors (prolonged tissue injury/inflammation)
- Spinal cord plasticity (↑ activity of “danger” receptors, ↓ inhibitory receptor activity)
- Altered neuromatrix (brain changes)
- Increased activity of fascilitatory descending pathways
Chronic Pain Syndromes

• Neuroplastic changes
• Altered neuronal excitability
• Changes in structures of pain matrix
  • Spinal cord
  • Thalamic Nuclei
  • Cortical areas
  • Amygdala
  • Periaqueductal gray
• Results in altered pain threshold, pain intensity, emotional affect
Central Sensitization

• A hyper excitability or dis-inhibition of the nervous system
Clinical Implications of Brain Changes

- Enhanced/Increased response to noxious stimuli
- Psychological and cognitive effects
- Altered body perception
Characteristics of Central Sensitization

- Perceived pain to non-painful stimuli
- Varying findings from visit to visit
- Generally deconditioned
- Discrepancy between subjective report of pain and physical findings
- Abnormal protective movements
- Anxiety and depression
- A frustrating experience for both patient and clinician
Conditions Presenting with Central Sensitization

- Chronic low back pain
- Fibromyalgia
- Chronic Fatigue Syndrome
- Complex Regional Pain Syndrome
- Chronic whiplash related pain
- Chronic pelvic pain
- Etc.
Chronic Pain and the ANS

• Several areas of interaction between the somatic and autonomic nervous system have been identified (peripheral, dorsal horn of spinal cord, brainstem, and forebrain)

• During a state of central sensitization, there is a corresponding increase in sympathetic nervous system activity
SNS stimulation: “Fight or Flight”

Excretion of stress hormones dopamine, (nor)epinephrine (nor)adrenaline) and cortisol

- ↑Heart rate and force
- Vasoconstriction
- ↑Blood pressure
- Sweating, goose bumps
- ↑ Respiration rate
- ↑ Muscle tension
- Sphincter constriction, hollow organ wall dilation
- ↓ Secretion of glands in respiratory and digestive system
- Pupil dilation
PNS Stimulation: “Rest and Restore”

- In many respects reverses the effects of the SNS:
  - ↓ Heart rate and force
  - ↓ Respiration rate
  - Sphincter relaxation
  - ↑ Smooth muscle wall contraction (except for blood vessels)
  - Skeletal muscle relaxation
  - ↑ Secretion of glands in respiratory and digestive system-improved digestion
What is the role of YBT in the treatment of the patient with chronic pain?
YOGA: The Basics
“Yoga teaches to cure what need not be endured and endure what cannot be cured.”

~ BKS Iyengar
Yoga defined

• Yoga = “yukti”: to yoke, to unite, to bring together.
What is Yoga?

- A complete “how-to-live system” originating in Asia. The purpose is optimal physical, emotional, and spiritual health.
What is Yoga?

“Yoga is a systematic technology to improve the body, understand the mind, and free the spirit”

Timothy McCall, MD

Yoga as Medicine
Yoga History

Patanjali: Scholar from India ~500 BC

Compiled the *Yoga Sutra* (Proverbs) outlining the Yoga path; summarizing the process and tools that can bring peace, wisdom, and well-being.

Main text to study for aspiring Yogi/ni

Hatha Yoga: Physical aspect of yoga

http://www.yogajournal.com/basics/160
Yoga citta vritti nirodhah  (Chapter 1, v. 2) :
Yoga is the resolution of the agitations of the mind.
Elements of Yoga

1. **Yama**: rules of social conduct
2. **Niyama**: rules of personal behavior
3. **Asana**: physical posture/exercises
4. **Pranayama**: control of life-force, breath deepening and control
5. **Pratyahara**: turning inward
6. **Dharana**: concentration, control of mind
7. **Dhyana**: meditation, mindfulness
8. **Samadhi**: ecstatic union, self-realization
Eight Branches of Yoga

1. Restraints
   - non-violence
   - truth
   - non-stealing
   - moderation
   - non-envy

2. Observances
   - Purity
   - Contentment
   - Discipline
   - Devotion
   - Self-study

3. Postures

4. Breath Practice

5. Inhibit senses

6. Concentration

7. Meditate on Truth

8. Union with Divine
1. Yama

- Rules of social conduct
  - Ahimsa – Non violence
  - Satya – Truthfulness
  - Asteya – Non stealing
  - Brahmacharya – Ethical conduct/moderation
  - Aparigrahaah – Non-covetousness
2. Niyama

Rules of personal behavior

- Shaucha – Purity
- Santosha – Contentment
- Tapah – Diligence
- Svaadhyaya – Self study
- Ishvarapranidhana - Devotion
3. Asana

Exercises/poses

• To create health, strength, flexibility, and discipline.

• Originally meant to prepare the body for sitting still in meditation and “purify” the body.

• Movement with complete awareness; movement linked with breathing. Moving meditation.

• To improve the flow of life force/energy in our body which creates improved overall health.
4. Pranayama

- “Breathing exercises”
- Prana=Life-force, Ayama=to stretch, extend
- Dis-ease is caused by blocked energy flow or imbalanced energy flow
- Purpose of pranayama is to optimize the amount of energy in the body by redirecting the flow of energy through calming or energizing techniques
5. Pratyahara

• The conscious movement of the energy/attention away from the senses

• In the state of pratyahara one still experiences the input from the senses but importantly, this input no longer agitates the mind as it does normally.
6-8 Meditation/Concentration/Mindfulness

- “Non-judgmental moment-to-moment awareness”
- “Being present”
- “Living in the Now”
- “Present moment awareness”

Jon Kabat-Zinn Ph.D. Full Catastrophe Living and MBSR courses
Holistic/Yoga versus Medical Philosophy

- Defines health as a state where **all systems** function optimally.

- Considers all levels of human being: physical mental/emotional, spiritual as inter-related (koshas).

- Defines health as the absence of symptoms/disease.

- Views humans largely in compartments (body separate from mind-body parts separate from each other); views physical symptoms mostly as either mechanical or chemical in nature.
YOGA: Research
Yoga Research: Bias in Clinical Trials

- Selection bias
- Lack of blinding
- Placebo effect
- Practitioner bias
- Publication bias
- Co-interventions
- Lack of follow up
Comparing Yoga, Exercise, and a Self-Care Book for Chronic Low Back Pain

To determine if yoga is more effective than conventional therapeutic exercise or a self-care book for patients with CLBP

• RCT

• N=101, 20-64 y/o, 3-15 months LBP

1. 12 weekly yoga class + HEP
2. 12 weekly PT exercise program + HEP
3. self-care book
Outcome:

• 12 weeks: yoga group better function (Roland disability scale) compared to book and exercise group

• 26 weeks yoga group better function, less pain (VAS) than book group.

Mean Roland Disability Scale scores at baseline, 6, 12, and 26 weeks by treatment group

Mean symptom bothersomeness scale scores at baseline, 6, 12, and 26 weeks by treatment group

Meditation Can Help Manage Anxiety, Depression and Pain
www.npr.org
47 trials (RCTs with active controls) with 3515 participants

- Mindfulness and mantra meditation

- Moderate evidence of
  - Improved anxiety
  - Reduced depression
  - Improved pain: 0.33 [0.03-0.62] at 8 weeks and 0.23 [0.05-0.42] at 3-6 months
Conclusions

• Clinicians should be aware that meditation programs can result in small to moderate reductions of multiple negative dimensions of psychological stress.

• Clinicians should be prepared to talk with their patients about the role that a meditation program could have in addressing psychological stress.
Yoga of Awareness in the Management of Fibromyalgia

To evaluate the effects of a comprehensive yoga intervention on fibromyalgia symptoms and coping

- RCT
- N=53
- Females ≥21

Eligibility criteria:
- >1 year FMS per ACR criteria
- Stable treatment regimen 3 months

Invited to informational meeting  
N = 382

Attended informational meeting and assessed for eligibility  
n = 64

Excluded n = 4  
Unstable treatment regimen = 2  
Physically disabled = 1  
Yoga > 3 times per week = 1

Declined to participate n = 7  
Class time incompatible = 1  
Too far/transportation = 1  
No time/too busy = 4  
Family crisis = 1

Randomly assigned and analyzed by intention to treat  
n = 53

Allocated to immediate yoga n = 25  
Received yoga n = 22

Lost to post assessment n = 3  
Class time incompatible = 2  
Not available/unknown = 1

Allocated to standard care while wait-listed n = 28

Lost to post assessment n = 2  
Relocated = 2
Yoga of Awareness intervention

- 8 classes
- 1x/week
- 120 minutes
- 7-12 patients per group
- Led by certified yoga teacher
Class Outline

- Gentle poses (40 minutes)
- Mindfulness Meditation (25 minutes)
- Breathing exercises (10 minutes)
- Yoga based coping techniques (20 minutes)
- Group discussions (25 minutes)
Home Practice

- 20-40 minutes/day
- 5-7 days per week
- DVD, audio, handbook
- Mat, bolster, eye pillow, blankets
- Daily record of time spent in yoga practice
- Instructed to modify exercises if needed
Mindfulness

• Non-judgmental, moment-to-moment awareness
• “Living in the Now”
• “Being present”
Mindfulness Practice

• Strategies for developing greater moment-to-moment presence of mind

• Acceptance of/willingness to learn from pain and other stressful experiences

• Recognize what choices contribute to more wellbeing versus suffering
• Reconnect with “simple being” (just being present)
• Distinguish between actual events and the minds’ stories
• Practice kindness and patience with oneself and others
• Practice of yoga nidra (=yoga sleep): a state of deep relaxation with full awareness
Outcome Assessments

- At start, 2 weeks, at end (and 3 months)
- Fibromyalgia Impact Questionnaire Revised (FIQR)
- Patient Global Impression of Change (PGIG) (at post treatment)
- Total Myalgic Score (TMS)
- Timed Chair Rise (30 sec)
- Sensory Integration for Balance Test (30 sec)
- Chronic Pain Acceptance Questionnaire
• Coping Strategies Questionnaire (Catastrophizing)

• Vanderbilt Multidimensional Pain Coping Inventory

• Daily diaries (pain, fatigue, distress, vigor, acceptance, relaxation)
Mechanisms of Pain Reduction with Yoga

• **Physiological** changes that alter the pain experience:
  • ↓ SNS activity
  • ↓ inflammatory markers
  • ↓ stress markers (cortisol)
  • ↑ Flexibility, strength, endurance
• **Behavioral** changes that influence pain:
  • (group) ↓ social isolation
  • ↑ social networks (= ↑activity)
  • (home) ↑ activity

• ↑ in daily practice of HEP is related to same-day improvement in pain, and next-day improvement in pain, fatigue, invigoration, acceptance, and relaxation.
Psychological changes:
- ↑ awareness of mental and physical state
- ↑ understanding of pain
- ↑ frequency of positive emotions
- ↑ physical, social, psychological resources
- ↑ pain acceptance
- ↑ self-efficacy for pain control
Conclusion

“At post-treatment, women assigned to the yoga program showed significantly greater improvements on standardized measures of FM symptoms and functioning, including pain, fatigue, and mood, and in pain catastrophizing, acceptance, and other coping strategies. This pilot study provides promising support for the potential benefits of a yoga program for women with FM.”

Follow-up of YoA for FMS-3 months

Results:

Post-treatment results in the wait-list group largely mirrored results seen at post-treatment in the immediate treatment group.

Follow-up results showed that patients sustained most of their post-treatment gains (FIQR remaining 21.9% improved at 3 months).

Yoga practice rates were good, and more practice was associated with more benefit for a variety of outcomes.
Goals for PT Treatment of Patient with Chronic Pain

Main goal: Improve function and QoL

- Reduce pain
- Regain ROM, strength, endurance
- Regain confidence, reduce fear
- Independence in self-care/pain management strategies
Components of PT Treatment of Patient with Chronic Pain

• EDUCATION:
  • Pain biology/physiology
  • Beliefs
  • Expectations
  • Stress and pain, etc

• Therapeutic exercise/Home exercise program
• Manual techniques/Self-massage
• Modalities
Purpose of adding YBT to PT Program

• Increased awareness
  • To create more choices!
  • To notice what causes/worsens or relieves pain (subtle)
  • To be able to intervene when symptoms are mild instead of waiting until severe
• To become aware of/change “thinking patterns” that may add to symptoms
• Improved relaxation
  • Reduced muscle tension
  • Reduced pain
  • Improved coping
  • Reduced inflammation, better healing environment
Integrating Yoga Techniques and Physical Therapy

• 1. Therapeutic exercises/Asana
• 2. Breathing techniques/Pranayama
• 3. Relaxation techniques/Mindfulness
1. Yoga Approach to Exercise

- Focus on mindfulness: constant awareness of how the body and mind react to movement/position
- Focus on relaxation (even during strenuous movements)
- Linking breath and movement—using breath to relax and stretch
Yoga Breathing Principles

Inhalation

- Inhalation is more active
- Inhale when expanding front of the body
- Inhale to “lengthen” the spine, before rotation or side bending

Exhalation

- Exhalation is more passive (unless forced)-typically used to aid in relaxation or deepening a stretch
- Exhale when “contracting” front of body
- Exhale to facilitate abdominal or pelvic floor muscles contraction
• Breathing should be effortless and deep
• Ideally through the nose
2. Breathing Exercises

• 3-part yoga breath
• Breath awareness
• Paced breathing (5-5 breath)
• Alternating nostril breathing
• Breath of Joy
• Breath linked to movements (count breaths instead of seconds during stretches)

All effective in reducing activity of sympathetic nervous system
3. Relaxation/Meditation Techniques

- Body scan/Body awareness practice
- Breath awareness practice
- Mantra practice
- Relaxation Response (Herbert Benson MD)
- Moving meditation (asanas, walking, etc)

Purpose: relaxation, enhancing PNS activity, reducing anxiety, depression, improve sleep.
Suggestions for Integrating YBT

• Slow and deep, synchronized breathing during exercise
• Count breaths instead of seconds
• Keep attention focused on body during exercise or manual therapy
• Teach basic breathing/meditation techniques as part of home exercise program
• Have patient practice these during modalities (may use guided meditation App, CD, etc)
Billing

• Neuromuscular reeducation (97112) !!

Neuromuscular reeducation of movement, balance, coordination, kinesthetic sense, posture and/or proprioception for sitting and/or standing activities. Clinician and/or patient perform therapeutic exercises to one or more body areas that facilitate reeducation of movement, balance, coordination, kinesthetic sense, posture, and proprioception. This code requires direct contact.
Billing

• Therapeutic exercise (97110)

Therapeutic procedure, one or more areas, each 15 minutes; therapeutic exercises to develop strength, endurance, range of motion and flexibility. Clinician and/or patient perform therapeutic exercises to one or more body areas to develop strength, endurance, and flexibility. This code requires direct contact.
Documentation Suggestions

- Patient received nmr: instruction in and performance of relaxation/meditation techniques with the purpose of reducing muscle tension and pain in...

- Patient was instructed in and performed manually assisted breathing exercises with the purpose of restoring proper coordination of trunk muscles during inhalation...

- Patient performed therapeutic exercises with synchronized breathing pattern to facilitate optimal relaxation of target muscles during stretches...
Case Presentation 1

- 34 y/o female
- RX: Chronic abdominal pain, pelvic floor dyssynergia, constipation, dyspareunia, migraines
- BM 1x/week
- Onset 13 years ago, after traumatic vaginal delivery
- Rectocele repair in 2005; 2 months no abdominal symptoms, but worse dyspareunia
- No exercise, high stress level, poor sleep, exhausted
• Diet: “gallon” of water/day, 2 cups of coffee, no breakfast, poor diet overall.

• 1 year of PT didn’t help—wasn’t compliant with home exercise program

• Anal manometry: hypersensitivity for urge with rectal distention and mild dyssynergia on manometry with adequate push.
Physical Exam:

• Appears fatigued, slouched posture
• Full range of motion major joints
• Many tender points throughout abdominal musculature, posterior hip musculature, hypertonicity pelvic floor muscles
• Normal strength and coordination pelvic floor muscles
• 8 visits total

• Education on:
  • Physiology of chronic stress, suggestions on how to reduce these changes
  • Diet, toileting habits, sleep hygiene
  • Importance of exercise, practical suggestions
  • Relationship dynamics and sexual issues

• Three part yoga breath, combined with relaxation of the pelvic floor muscles and abdomen
• Educated on practicing “mindfulness” in daily activities
• Abdominal massage techniques
• Paced breathing (5/5)
• Basic home exercise program, gentle stretches combined with paced breathing
• Manual techniques to abdomen, neck, upper back, pelvic floor muscles
• Yoga based strengthening and balance exercises
• Educated on use of vaginal dilator
Outcome:

- Bowel movement daily or every other day
- Abdominal pain minimal to none
- Independent in home program: exercise, meditation, self-massage techniques
- Improved lifestyle with regular healthy diet and exercise
- Decided to go to counseling to deal with relationship issues. Did not resume intercourse
Case Presentation 2

47 y/o female with chronic pelvic and low back pain and feeling of heaviness in pelvis, “bladder falling out”

- Chronic mild SUI
- Urinary frequency
- IC-hydrodistention possibly helped somewhat
- Constipation
- Valley fever; very deconditioned, muscle aches
- Depression and anxiety
• Pain 7/10
• ↑ activity, walking, intercourse, yoga
• ↓ lying down, rest
• “Type A”
• 10-15 voids/day
• Nocturia x3
Examination:

- Normal ROM major joints
- Functional strength major muscles
- Severe hypertonicity lumbar and hip muscles
- Much pain with palpation PFM
- Poor coordination PFM, strength: weak
- Rapid, shallow breathing pattern
- Elevated shoulders with tight neck muscles
Treatment:

• Education/Self-care:
  • Mindfulness/Body scan
  • 5/5 breathing technique
  • Instruction in types of yoga
  • Benefits of counseling
  • Physiology of stress and relationship stress/muscle tone/pain
  • Energy management suggestions
  • Bladder/voiding education
**Exercise**

- **1-5**
  - Stretching hips, low back with paced breathing
  - Relaxation techniques for PFM/dilators
  - Walking program
  - Communication with personal trainer

- **6-12:**
  - PFM strengthening exercises
  - Gradually progressive yoga exercises
  - Using mindfulness/affirmations during repetitive exercise
Manual Therapy:

• MFR to neck, low back, hips, PFM
• Self-stretches PFM

Modalities:

• Interferential stimulation/hot-pack (with meditation techniques)
• TENS set-up
Outcome:

• No low back, pelvic pain
• Able to run 3 miles
• Exercise 6x/week
• Pain free intercourse
• Improved voiding (≥ 2 hours)
• Nocturia 0-1
• Improved bowel function (every other day)
Namaste!
QUESTIONS?

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Resources

• Apps:
  • Insight Timer (free/$2.99)
  • Mayo Clinic Meditation ($2.99)
  • Breath Pacer-Larva Labs ($2.99)
Resources

• Websites:
  - www.relaxationresponse.org
  - http://www.sedonameditation.com
  - http://www.umassmed.edu/cfm/about/index.aspx (MBSR Jon Kabat-Zin)

• [http://www.iayt.org](http://www.iayt.org) (International Yoga Therapy Association)

• [http://www.yogaalliance.org](http://www.yogaalliance.org)


Hill, C. (2013). "Is yoga an effective treatment in the management of patients with chronic low back pain compared with other care modalities - a systematic review." J Complement Integr Med.(1).


Recommended Reading

- Timothy McCall, M. (2007). *Yoga as Medicine; the yogic prescription for health and healing*


- Faulds, R. (2006). *Kripalu Yoga; A guide to practice on and off the mat*