Medical Yoga and Integrative Medicine: Pediatric Mental Health

Ina Stephens, MD, RYT, C-IAYT, FAAP
Pediatrics, Pediatric Infectious Diseases
University of Virginia Medical Center
March 28th, 2020
Disclosures

Neither my spouse nor I have any personal or professional financial relationship or interest with any proprietary entity producing healthcare goods/or services.

We have no relevant financial disclosures related to the content of this presentation.
Leading Diagnoses Treated at Integrative Medical Centers

**Top 10 Diagnoses:**
- Acute pain/Chronic pain
- Stress/Anxiety/Depression
- Sleep Disorders
- Cancer
- Arthritis/Autoimmune Dz
- Allergies
- Hypertension/Heart Disease
- Gastrointestinal
- Obesity
- Diabetes
# UVA Pediatric Medical Yoga and Integrative Health Clinic

## First 100 patients: 3-24 years

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>Number</th>
<th>Diagnoses</th>
<th>Number</th>
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<tbody>
<tr>
<td>Anxiety</td>
<td>59</td>
<td>Motor Dysfunction</td>
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<tr>
<td>Depression</td>
<td>26</td>
<td>PTSD</td>
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<tr>
<td>Chronic Pain</td>
<td>22</td>
<td>Sensory Integration</td>
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<td>ADHD</td>
<td>18</td>
<td>OCD</td>
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<tr>
<td>Anger Outbursts</td>
<td>20</td>
<td>Tic Disorder</td>
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<tr>
<td>Abdominal Pain</td>
<td>18</td>
<td>Eating Disorder</td>
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<tr>
<td>Insomnia</td>
<td>18</td>
<td>Seizures</td>
<td>3</td>
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<tr>
<td>Migraine</td>
<td>11</td>
<td>Dizziness</td>
<td>3</td>
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<tr>
<td>Joint Pain</td>
<td>9</td>
<td>DUB</td>
<td>2</td>
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<tr>
<td>Panic attack</td>
<td>9</td>
<td>Back Pain</td>
<td>2</td>
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<tr>
<td>Autism</td>
<td>7</td>
<td>Recurrent Infection</td>
<td>2</td>
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<tr>
<td>Autoimmunity</td>
<td>6</td>
<td>Suicide Ideation/Attempt</td>
<td>2</td>
</tr>
<tr>
<td>Developmental Delay</td>
<td>6</td>
<td>Hypertension</td>
<td>1</td>
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<tr>
<td>Obesity</td>
<td>6</td>
<td>Hyperemesis</td>
<td>1</td>
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<tr>
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<td>Meningomyelocoele</td>
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Medical Yoga Therapy

- Use of yogic practices for prevention/treatment of medical conditions

  - Incorporates:
    - Asana (postures)
    - Breathing techniques (pranayama)
    - Mindfulness (non-judgmental awareness of present moment)
    - Meditation
    - Self-reflection/study

- Individualized, personalized and holistic approach
Medical Yoga and Integrative Health Prescription

- Complementary with standard of care with physician/medical provider
  - Prescribing and/or continuing appropriate psychotherapy or medication
- Yogic Practices
- Healthy, nourishing diet (largely plant-based, organic, preservative-free)
- Supplemental medication/vitamins/herbal therapy
- Reduce substances – Tobacco, ETOH/drugs
- Sleep hygiene
- Support group/friend to help you heal
  - Includes psychotherapy and group therapy
Dietary Prescription: Anti-inflammatory “Mediterranean” diet:

What to Recommend:

- **Decrease in:**
  - “White carbohydrates”
    - Pro-inflammatory
    - Replace with complex carbs/whole grains
  - Processed foods

- **Increase in:**
  - Fish (salmon and shellfish)
    - Decrease peanut butter – high Omega-6 FA
  - Nut butters (almond, walnut, cashew)
  - Flaxseed and chia seed
  - Omega-3 FA’s/Magnesium
  - Dark-leafy vegetables
    - Spinach, Kale, Brussel sprouts
  - Probiotic-enriched foods
    - Kefir, greek yogurts, sauerkraut, miso

What This Can Do:

- **Increases:**
  - Omega-3 FA’s
  - Magnesium
  - B-vitamin Complex
  - Vitamin D
  - Iron
  - Fiber

- Decrease pro-inflammatory Omega-6 FA’s
- Improved flora of Microbiome
- Neurotransmitters from food are:
  - Serotonin – tryptophan
  - Dopamine and Norepinephrine – tyrosine

Delarue J, et al. Diabetes Metab. 2003
### Summary Advice on the Use of Omega-3 Supplements, Vitamins, and Minerals for Mental Health

<table>
<thead>
<tr>
<th>Herb for Indication</th>
<th>Recommend (grade B or better and GRAS)</th>
<th>Tolerate (grade C or less for effectiveness but GRAS)</th>
<th>Monitor (grade B or better but substantial side effects)</th>
<th>Avoid (grade C or worse and substantial side effects)</th>
</tr>
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<tbody>
<tr>
<td>Omega-3 supplements</td>
<td>ADHD and comorbid condition Depression</td>
<td>Anxiety</td>
<td>Depression</td>
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<tr>
<td>B complex</td>
<td>Depression</td>
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<tr>
<td>Inositol</td>
<td>Anxiety</td>
<td>Depression</td>
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<td>Folate</td>
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<tr>
<td>Vitamin D</td>
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<tr>
<td>Iron</td>
<td>RLS-related insomnia</td>
<td>ADHD</td>
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<tr>
<td>Magnesium</td>
<td>Anxiety</td>
<td></td>
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<tr>
<td>Zinc</td>
<td>ADHD</td>
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</tbody>
</table>

**Omega-3 FA’s:**
- Inhibit the HPA axis and increase levels of BDNF
- **Depression, ADHD** – Cochrane/Meta-analyses:
  - Osher Y, et al. CNS Neurosci Ther. 2009
# Supplements

<table>
<thead>
<tr>
<th>Depression</th>
<th>Anxiety/Stress</th>
<th>Sleep/Insomnia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EBM:</strong> Cochrane/Meta analysis</td>
<td><strong>EBM:</strong> Cochrane/Meta analysis</td>
<td><strong>EBM:</strong> Cochrane/Meta analysis</td>
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<tr>
<td>Inositol</td>
<td>Magnesium</td>
<td>Magnesium</td>
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<tr>
<td>Rhodiola rosea</td>
<td>L-Theanine</td>
<td>Melatonin</td>
</tr>
<tr>
<td>St. John's Wart (Many drug interactions)</td>
<td>L-Bromine</td>
<td>L-tryptophan</td>
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<tr>
<td>Lavender Oil</td>
<td>Folic Acid (MTHFR mutation only)</td>
<td>Chamomile</td>
</tr>
<tr>
<td>Inositol (B8)</td>
<td></td>
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</tr>
</tbody>
</table>

- Boyle NB, et al. Nutrients. 2017
- Ikonte CJ, et al. Nutrients. 2019
- Wei S, et al. Sleep Med. 2019
CAM Herbal Supplements:

Often used, Some studies, No systematic reviews or insufficient evidence:

- Ashwagandha
- 5-HTP
- L-Carnitine
- Maca
- Bacopa
- GABA
- Passion Flower
- SAM-e
- Arginine
- Valerian
- Kava
## Summary Advice for Herbal Remedies for Mental Health

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<td>Chamomile</td>
<td>Anxiety, Stress</td>
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<td>Coffee</td>
<td>Alertness, cognitive performance</td>
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<td>Anxiety</td>
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<td>Ginkgo</td>
<td>ADHD</td>
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<td>Kava</td>
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<td>Anxiety</td>
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<td>Lavender</td>
<td>Anxiety, Sleep (aromatherapy)</td>
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<td>Lemon balm</td>
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<tr>
<td>Passion flower</td>
<td>Anxiety</td>
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<td>Pinebark extract</td>
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<td>Rhodiola</td>
<td>Anxiety, Depression</td>
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<td>Saffron</td>
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<td>St. John’s wort</td>
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<td>Turmeric</td>
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<tr>
<td>Valerian</td>
<td>Anxiety, Depression</td>
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Dietary Supplements - Quality

- Several companies have started independently testing products:
  - Consumer Lab – ConsumerLab.com
  - NSF – www.nsf.org
  - Good Manufacturing Practices

- Resources:
  - NIH - National Center for Complementary and Integrative Health
  - Office of Dietary Supplements at the National Institutes of Health
  - National Cancer Institute’s Office of Cancer and Complementary and Alternative Medicine
Sleep Hygiene - Start 1-2 hours before going to sleep:

- Turn off all screens/electronics ~ 45 mins before sleep
  - Blue Light Glasses if must do homework/screen time
  - Dim overhead lights
- Relaxation techniques
  - Deep breathing, guided meditations, stretching
- No caffeine after dinner
  - Decaffeinated green tea – L-theanine and L-bromine
- Bed is for sleeping
  - Not for homework
- Aromatherapy – Lavender, Frankinsence, Bergamot, Lemon Balm, Sandalwood
  - Diffuser, bath oils, Jewelry dispensers – lava bracelets, necklaces
- Magnesium – 250-400mg one hour prior to sleep
  - Magnesium Epsom Salt baths – excellent skin penetration
Stress and Non-communicable disease

- CDC estimates that stress account for about 75% of all doctors visits
- Up to 90% of all visits to PCPs are for stress-related complaints
  - Inflammation with elevated cortisol levels
    - Headache, back pain, hypertension, arrhythmias, IBS, ulcers, skin problems, fatigue, obesity, migraines, hyperlipidemia and accidents
    - Depression, anxiety, PTSD, insomnia

- [https://www.cdc.gov/nchs/fastats/physician-visits.htm](https://www.cdc.gov/nchs/fastats/physician-visits.htm)
Chronically High Levels of Cortisol are Neurotoxic

- Impairs brain regions with high cortisol receptors
  - Hippocampus and PFC
- Activates amygdala
  - Increased fear/anxiety/threat
- Depletes “positive” neurotransmitters:
  - Dopamine, GABA, serotonin, DHEA
- Impairs limbic function
  - Behavior/emotions
- Associated with:
  - Accelerated aging, cognitive inhibition, impaired memory and ability to learn
  - Depression and anhedonia
  - Insomnia
  - Anxiety

Mindfulness, Yogic Practices and Inflammation

- Decreases both acute and chronic stress levels
  - Decreases inflammatory markers: C-RP, IL-6, TNF-α, IL-1 β, cortisol
  - Reduces oxidative stress
    - Reduction in serum malondialdehyde
  - Increases levels of multiple immunoglobulins and NK cells
  - Higher levels of leptin and adiponectin
    - Natural anti-inflammatory

- Regulates autonomic nervous system
  - Brings SNS/PNS into balance
  - Decreases cortisol
    - HPA axis

Mindfulness and Yogic Practices Reduce Circulating Levels of Cortisol

- Cortisol - elevated with stress, anxiety, depression, PTSD, and chronic pain
  - Yoga down regulates cortisol production, thus decreases symptoms

- Reduces firing of Locus Ceruleus
  - Principal site for synthesis of norepinephrine in response to stress and panic
    - Relaxation, quiescence, reduced respiratory/heart rates

- Decreases release of CRH and Cortisol

- Increases B-endorphins naturally

- **Enhances and increases parasympathetic tone**

*Antonijevic I, Stress 2008*
Yogic Practices Increase Levels of Hormones and Neurotransmitters

- **Serotonin, GABA and Dopamine**
  - All natural “anti-depressants”
  - Serotonin modulates appetite, sleep, mood balance, libido, and cognition

- **Oxytocin**
  - “Bonding hormone” - Increases feelings of connectedness, being seen and being heard

- **Melatonin**
  - Helps with sleep, sleep quality and sleep regulation
  - Improved sense of “well-being” with high nighttime levels of Melatonin

- **Bradykinin**
  - Causes vasodilation, thus lowers blood pressure
  - Activates the PNS stimulating rest and relaxation
  - Particularly activated by Pranayama practice

*J. Thirthalli, et al, Indian J Psychiatry, Jul 2013*
Mindfulness Meditation, Yoga and Cortisol in Depressed Patients

- Cohort of depressed outpts (N-54) had higher levels of serum cortisol level than the healthy controls
  - G1 - Conventional drug therapy (DT) alone - N-16
  - G2 - Yoga therapy (YT) alone - N-19
  - G3 - Drug therapy along with yoga therapy (DT/YT) - N-19
  - G4 - Healthy controls (N-18)

- All treatment associated with drop in cortisol, however:
  - YT group - significantly greater drop in cortisol than DT group
  - Both YT and DT/YT - greater reductions in cortisol than DT alone
  - YT group - high correlation between decreased cortisol and antidepressant response
    - p<0.008, p < 0.006, p<0.001 respectively

Yoga, Mindfulness Meditation and the Amygdala

- Diminished activity and size in anxiety-related areas:
  - Amygdala shrinks

- Diminishes Connections:
  - Functional connections between amygdala and PFC are weakened
  - Less reactive to stressors

- Expert meditators have:
  - Decreased amygdala size and activity
  - Increased size of PFC, hippocampus and insular cortex
  - Emotional regulation

Mindfulness Meditation Effect on Amygdala

Image courtesy of G Desbordes, Massachusetts General Hospital (The right amygdala is marked by a red cross hair and colored in blue.)

What is Mindfulness?

- **Mindfulness and Meditation**
  - Is not about bliss
  - About a sense of:
    - Presence
    - Balance
    - Attention
    - Connection with what is most fundamentally important in your life

“Moment to moment nonjudgmental awareness to the present unfolding of experience.”

*Jon Kabat-Zinn*
Mindfulness Meditation Practices

• Emphasize small, short mindful moments
  • Can be just as good and helpful as long meditation
• Practice without judgement
  • Remind that this is a practice, no one is perfect
• Start with something easy and tangible
  • Breath
  • Bell
  • Body
Mindfulness Meditation Practices

• **Listen to a bell**
  - Focus on paying attention to what is heard
  - Use a singing bowl, a bell, a set of chimes or a phone app with bell sounds
  - Make the sound and then listen carefully until sound is no longer heard
  - Take a deep breath before the sound, then exhale for the entire length of the sound

• **Mindful eating practice**
  - Before mealtime, ring a Tibetan singing bowl. Be silent while it rings
    - Very centering way to come together and eat a meal
  - Eat a small piece of chocolate with all 5 senses, before swallowing!
Mindfulness Meditation Practices

- **Body Scan Meditation**
  - Guided or not
  - Very helpful for chronic pain

- **Gratitude Journal**
  - Focus on the positive in life, not the negative

- **Meditation**
  - Deep breathing x 5-7 counts
    - Inhale:exhale ratio of 1:2
  - Sit quietly x 2 minutes
    - Work up to 5 minutes
  - Guided meditation apps are very helpful
Pranayama prescription: *Rajasic depression, Chronic Pain and Constipation*

**• Emphasizes exhalation, increasing PNS**
  - Viloma 3 – Deep abdominal/diaphragmatic breaths
    - Prolonged exhalation
    - Turns on the PNS and GI tract almost immediately
  - Nadi shodana pranayama – Alternative nostril breathing
    - Relaxes the mind and excellent for anxiety
    - Very calming during panic event
  - Bhramari pranayama – Sense withdrawal with continuous humming during exhalation
    - Calming the mind
    - Releases the mind of anger, agitation, frustration or anxiety.
    - Decreases heart rate
  - Shitali Pranayama – Cooling breaths
    - Helps to decrease stress
    - Good for anger/frustration

- Pramanik T, etal. Nepal Med Col J, 2010
- Chaddha A, Complement Ther Med. 2019
- Tiwari N. Int J Yoga. 2019
Pranayama practice: *Tamasic* Depression

**Emphasizes inhalation, activating SNS:**

- **Viloma 1-**
  - Increases the length of the inhalation relative to the exhalation
  - Stimulating; brings a feeling of ease and lightness to the body

- **Kapalabhati**
  - Increases metabolic rate, aid in weight loss, helpful for diabetes
  - Energizing, uplifting and activating

- **Bhastrika**
  - Invigorating, energizes the body and clears the mind
  - Great for anger outbursts – relieves tension, anger and anxiety
  - Warms the body, increases gastric emptying and reduces inflammation.

- **Do not to prescribe pranayama for Tamasic depression for one with Rajasic qualities**
  - Will increase agitation

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- Dinesh T, Int J Yoga. 2015
- Budhi RB, Int J Yoga. 2019
- Hakked CS, J Ayurveda Integr Med. 2017
Pranayama – Anxiety, Chronic Pain

Nadi Shodana
Case 2: Pranayama – *Tamasic* Depression/Anger Outbursts

Bhashrika Pranayama
Asana Prescription – Rajasic Depression

Restorative forward bending activates PNS activity and provides calming relief.
Asana Prescription – *Tamasic* Depression

Yoga postures that open the chest and shoulders facilitate deeper breathing providing physical relief and increased energetic flow.
Questions?