Evidence-based Integrative Medicine in Allergic & Immunology

2021 ACAAI Annual Meeting
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University of Arizona College of Medicine, Tucson

Disclosures

• No Relevant Financial Disclosures
• Practitioner of Yoga
• Integrative Medicine Committee
• Graduate of Andrew Weil Center for Integrative Medicine (2020)
• Co-Director, Integrative Medicine in Internal Medicine Residency, University of Arizona Department of Medicine, Tucson (2021)
Integrative Medicine: What’s in a Name?

<table>
<thead>
<tr>
<th>NIH</th>
<th>AWCIM</th>
<th>WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Person</td>
<td>Whole Person</td>
<td>Physical &amp; Mental Health</td>
</tr>
<tr>
<td>Lifestyle Approach</td>
<td>Multimodal Intervention</td>
<td>Theories, beliefs and experiences indigenous to different cultures</td>
</tr>
<tr>
<td>Practitioner / Patient</td>
<td>Coordination of Care; Provider/Institutions</td>
<td>Beyond (country’s) health care system</td>
</tr>
<tr>
<td>All Appropriate therapies</td>
<td>Conventional / Complementary Therapies</td>
<td>Merges Traditional / Complementary Therapies</td>
</tr>
</tbody>
</table>

NIH – National Institute of Health
AWCIM – Andrew Weil Center for Integrative Medicine
WHO – World Health Organization

Defining Principles of Integrative Medicine

- Patient and practitioner are partners
- Mind, spirit, and community factors considered to influence health, wellness and disease
- Appropriate use of both conventional and alternative methods
- Natural and less invasive interventions should be used whenever possible.
- Neither rejects conventional medicine nor accepts alternative therapies uncritically
- Good medicine is based in good science
- Health promotion and the prevention of illness are paramount.
- Practitioners commit themselves to self-exploration and self-development

Adapted from Andrew Weil Center for Integrative Medicine, 2021
Pretty text heavy - would shorten
Shroff, Puneet - (pshroff), 9/14/2021
You are already doing this! Let us understand and improve!

“Evidence-Based” Integrative Medicine

**Pros**
- Rooted in scientific principles and practices
- Ensure “first do no harm”
- Validated and accepted
- Evidence-Informed

**Cons**
- Lifestyle practices hard to quantify
- Individual characteristics contribute to variability
- Hard to compare to conventional treatments
Botanicals and Herbs

Polyphenols & Targets of Inflammation

**Curcumin (Turmeric)**

- Anti-inflammatory
- Antibacterial
- Anti-viral
- Antifungal
- Antioxidant
- Suppress NF-κB
- Modulate inflammatory response/ cytokine release

Wang W et al. Biomed Pharmacotherapy 2021
Curcumin in Asthma

- Prior Studies have shown improvement of FEV1
- **Children/adolescents** with asthma randomized to 30 mg/kg/day of *C. longa* x 6mos (500mg – 1000mg/day)
  Capsule 250 mg plant material: 11 mg of curcumin and 2 mg of demethoxycurcumin
- Curcumin group experienced fewer nighttime awakenings, use of SABA, and better disease control after 3 AND 6 months of treatment
  - No change FEV1 at 6 months
  - Both groups showed less frequency of symptoms and interference with normal activity

- **Take-Home**: Curcumin may be possible add-on therapy in adolescent asthma symptoms

Pine Bark Extract

- **Pine Bark / Pycnogenol™**
  - Proprietary mixture of water-soluble bioflavonoids, extracted from French maritime pine containing proanthocyanidins
  - Pre-clinical studies have indicated benefit in nasal/ocular rhinitis symptoms
Pine Bark - Allergic Rhinitis

- 39 sAR patients treated 5–8 weeks before birch allergy season w/ Pycnogenol™
- Lower eye (~35%) and nasal (~20.5%) symptom scores compared to placebo
  - Best results when taken 7–8 weeks ahead of the allergy season

- **Take-home**: Pycnogenol™ may improve nasal symptoms in tree-sensitized sAR optimized by pre-treatment lead-in time before tree pollen season

Wilson D et al. Phytotherapy Research 2010

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Pine bark in Asthma

- Overall, Cochrane analysis favors use of Pycnogenol™ in asthma:
  - Robertson et al (2020) identified 86 mild-moderate adult/pediatric asthmatics ranging 4 to 12 weeks:
    - Favor improved lung function (FEV1, FEV1/FVC) and **reduced albuterol inhaler need**

- Lau et al: DBPC-RCT of mild-moderate asthmatics age 6-18 over 3 months
- Pycnogenol™ showed significantly greater **improvement in lung function**
  - Reduced use of rescue inhalers more often than placebo
  - Significant ↓ urinary leukotrienes (LTC/D/E4)
- **Dose**: 1mg/lb divided into bid
“An Apple a Day, Keeps the Doctor Away…”

- **Quercetin**
- Bioflavonoid found in fruits and vegetables, specifically apples, berries and onions as well as tea, red wine
- Inhibits release of histamine and mediators during allergic responses
- Antioxidant associated with reduction of chronic diseases including Diabetes, CAD, certain cancers and more

**Quercetin: Mechanisms In Atopy**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Model System</th>
<th>Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibition of mast cell activation</td>
<td>2D (human mast cells)</td>
<td>Inhibition of mast cell activation</td>
</tr>
<tr>
<td></td>
<td>3D (human mast cells, atherosclerotic plaques)</td>
<td>Inhibition of mast cell activation and mediators release</td>
</tr>
<tr>
<td></td>
<td>Human cultured mast cells</td>
<td>Release of cytokines, PGE2, IL-6, IL-10, IL-12, IL-13, IL-22, TNF-α, IL-5, IL-3, IL-4</td>
</tr>
</tbody>
</table>

**Inhibition of mast cell release**

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</tr>
</tbody>
</table>

**Suppression of eosinophil activation**

- GVA-induced eosinophilic eosinophils
- Inhibition of eosinophil survival and function
- Decrease in eosinophil survival in bronchial lavage fluid
- Inhibition of eosinophil activation

**Relaxation of muscle**

- Male/A1 mice
- Inhibition of phosphodiesterase
- Suppresses muscle twitch of fibroblasts
- Reduction of production of inflammatory cytokines
- Inhibition of muscle contraction

**Suppression of mast cell and eosinophil activation**

- Human mast cells
- Inhibition of degranulation
- Decrease in eosinophil survival and function
- Inhibition of mast cell activation


Quercetin: A Natural Antioxidant

- Inhibits allergic responses
- Reduces inflammation
- Improves asthma symptoms

PlantMedicineNews.com
Quercetin: Where does the data fall?

- Knekt et al: Finland Public Registry on Chronic Diseases and dietary intakes of over 10,000 Finns
  - Dietary quercetin intake (p=0.05) associated with lower asthma incidence among total flavonoid intake
- Willers et al suggest apple consumption during pregnancy in Netherlands protects against childhood atopy
- Shaheen et al: Comparative Survey of 1500 UK asthmatics found apple intake showed a stronger inverse relationship with asthma
  - Correlated with at least two apples per week
  - Not seen in onion, tea, and red wine consumption
  - Weaker association of total fruit and vegetable intake
- Woods et al reviewed 1600 adult asthmatics in Australia
  - Decreased risk of asthma and bronchial hyperreactivity with apple and pear intake.
  - Total fruit and vegetable intake not associated with asthma risk or severity

Take-home: Increased dietary quercetin, specifically apple/pear, has favorable use in asthma
- Quercetin dose as supplement: 500mg BID

Soy Isoflavone: Personalized Asthma care?

- Soybeans and soy isoflavone genistein are commonly found among legumes, grains, vegetables and other popular dietary sources
  - Appear to lower anti-inflammatory markers in TH2 asthma
  - Prevent asthma remodeling of extracellular matrix (ECM) through Plasminogen activation inhibitor (PAI-1)
  - Prior studies did NOT show improvement of FEV1 at 6 months
- DB-PCT of 49mg soy isoflavone in 265 poorly controlled adolescent/adult asthmatics divided by PAI-1 phenotype (high/low)
  - Significant association between soy isoflavone and high PAI-1 group in reduction of steroids but NOT in the low PAI-1 genotype.

Take-home: Soy Isoflavone may have a role in personalized asthma care to reduce frequency of exacerbations and steroids

Boswellia (Indian Frankincense)

- Gum-resin extracts of Boswellia serrata have traditional uses dating back centuries for inflammatory diseases.
  - Ayurveda: anti-arthritic activity and remedy for diarrhea, dysentery, boils, sore throat, bronchitis, asthma, cough, and liver disease (Siddiqui, Indian J of Pharmaceutical Sciences 2011)

- In vitro studies show boswellic acids inhibit synthesis of 5-lipoxygenase (5-LO) impacting bronchoconstriction and vascular permeability

- Yughandar et al took a proprietary Boswellia compound with Aegle Marmelos / Wood fruit and confirm in vitro down-regulation of 5-LO and TH2 regulation pathway in human monocytic cells of moderate-severe asthmatics

Boswellia with Licorice, Curcumin in Asthma

- Houssen et al: Uncontrolled asthmatics on ICS (mid-high dose budesonide or fluticasone) with sAR confirmed by SPT
- DB-RCT (65) Randomized to one capsule three times daily before meals for 4 weeks containing:
  - 150 mg of boswellic acid (37.5% boswellic acid)
  - 50 mg of licorice extract from (6.5% glycyrrhizin)
  - 15 mg of curcumin from 2.2% curcumin
- At 4 weeks: significance noted of reduction of weekly asthma symptoms, including daytime and nocturnal awakening, and need of rescue medication
  - Trend of improvement of FEV1 and PEF was also noted

- Take-home: Asthma control may improve in patients but more comparative therapeutics, ICS-LABA and longer assessment period warranted
Glycerrhiza (Licorice root)

- Anti-inflammatory properties
- Increase mucociliary clearance and eosinophil apoptosis in chronic rhinosinusitis

Gariuc et al: 50 patients with AR randomized to INS or nasal glycyrrhizic acid (GlyAc) 2 sprays/nostril for 60 days
  - Compliance was good without significant adverse effects, including >90% of GlyAc patients.
  - Primary endpoint: non-inferiority of GlyAc of perceived nasal symptoms

Nasal Glycerrhiza in Allergic Rhinitis

- GlyAc group: Significant change of ALL rhinitis parameters at 60 days from baseline
  - No significant difference between groups: use of antihistamines, all endoscopic signs, and perception of nasal obstructive symptoms
  - Patients treated with INS had significantly lower resistances, lower perception of symptom severity and reduced impact on daily activities

- **Take-home:** Possible role for nasal glycerrhiza in AR as add-on, however, requires further studies with respect to dosing, frequency

Topical Licorice in Atopic Dermatitis

- *Glycyrrhiza glabra* has been used for dermatitis, eczema, pruritus, etc.
- Preclinical study of 42 patients, VEL-091604 cream of licorice root, willow bark extract, and gentian root reduced erythema without significant intolerance.
- Prospective, open-label proof of concept study in 10 pts with variable, localized AD
- Applied BID x 2 weeks, assessed by SCORAD (1 and 2 wks)

**Take-home:** Topical glycyrrhiza may be well tolerated in mild AD, but needs more study of effects on maintenance of eczema.

Seiwether J and Tasiopoulou G. Planta Med 2019
Microbiome and Atopy

Summary of various early-life environmental exposures and specific gut microbiota associated with the development of allergic disease

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Bacteria</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Animal Exposure</td>
<td>Bacteroides, Ruminococcaceae, and Enterococcaceae</td>
<td>Asthma, Allergic Rhinitis, and Eczema</td>
</tr>
<tr>
<td>Delivery by Cesarean-section</td>
<td>Bacteroides, Ruminococcaceae, and E. coli</td>
<td>Asthma, Allergic Rhinitis, and Eczema</td>
</tr>
<tr>
<td>Decreased Stool Filling</td>
<td>Clostridiales, Lachnospiraceae, and Bacteroidales</td>
<td>Eosinophilia</td>
</tr>
<tr>
<td>Parental Antibiotic Use</td>
<td>Phascolarctaceae and Coriobacterales</td>
<td>Asthma and Eosinophilia</td>
</tr>
<tr>
<td>Breast-feeding</td>
<td>Bifidobacteraceae</td>
<td>Asthma and Eosinophilia High-risk pop.</td>
</tr>
</tbody>
</table>
<pre><code>                                                | Coriobacteraceae, Enterococcaceae, and Enterobacteraceae               | Food Allergy, Allergic Rhinitia                                      |
</code></pre>


Early Childhood Microbiome and Asthma

**VDAART = Vitamin D Antenatal Asthma Reduction Trial**

<table>
<thead>
<tr>
<th>STOOL METABOLICOMICS AVAILABLE</th>
<th>ENTIRE VDAART COHORT</th>
<th>All children (n = 361)</th>
<th>Asthma (n = 85)</th>
<th>No asthma (n = 276)</th>
<th>P value</th>
<th>All children (n = 806)</th>
<th>Asthma (n = 125)</th>
<th>No asthma (n = 681)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal antibiotics during or child antibiotics after delivery, no. (%)</td>
<td>157 (43)</td>
<td>45 (53)</td>
<td>112 (41)</td>
<td>.06</td>
<td>377 (42)</td>
<td>65 (63)</td>
<td>312 (40)</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Birth by cesarean section, no. (%)</td>
<td>113 (31)</td>
<td>24 (28)</td>
<td>89 (32)</td>
<td>.57</td>
<td>239 (30)</td>
<td>40 (32)</td>
<td>198 (30)</td>
<td>.65</td>
<td></td>
</tr>
<tr>
<td>Exclusive breast-feeding until age 4 mo, no. (%)</td>
<td>109 (31)</td>
<td>12 (15)</td>
<td>97 (36)</td>
<td>.001</td>
<td>247 (33)</td>
<td>16 (14)</td>
<td>231 (32)</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Daycare by age 3 y, no. (%)</td>
<td>178 (50)</td>
<td>47 (57)</td>
<td>131 (49)</td>
<td>.24</td>
<td>278 (34)</td>
<td>71 (62)</td>
<td>207 (32)</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Pet dog during infancy, no. (%)</td>
<td>88 (25)</td>
<td>17 (20)</td>
<td>71 (26)</td>
<td>.38</td>
<td>168 (22)</td>
<td>21 (18)</td>
<td>147 (22)</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>At least 1 living child previously born to mother, no. (%)</td>
<td>205 (57)</td>
<td>50 (59)</td>
<td>155 (56)</td>
<td>.76</td>
<td>435 (54)</td>
<td>67 (54)</td>
<td>368 (55)</td>
<td>.82</td>
<td></td>
</tr>
</tbody>
</table>

## Recent Studies of Probiotics in Allergic Rhinitis

Adapted from Linton et al. Annals of Allergy, Asthma & Immunology 2021

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Study design</th>
<th>Probiotic type</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kang et al</td>
<td>2020</td>
<td>MC, R, PC, DB</td>
<td><em>B. longum</em> IMSS, <em>L. planatarum</em> IM76</td>
<td>Improved TNSS and RCAT score in <em>D. farinae</em> allergy after 4 weeks</td>
</tr>
<tr>
<td>Ahmed et al</td>
<td>2019</td>
<td>R, PC, DB</td>
<td><em>L. paracasei</em></td>
<td>Probiotic for 6 weeks as effective as <em>cetirizine</em> for perennial AR in children</td>
</tr>
<tr>
<td>Yamashita et al</td>
<td>2020</td>
<td>R, PC, DB</td>
<td><em>L. helveticus</em> SBT2171</td>
<td>Improved pAR symptoms after 16 weeks with improved nasal eosinophils</td>
</tr>
<tr>
<td>Jalali et al</td>
<td>2019</td>
<td>R, PC, DB, C</td>
<td><em>L. acidophilus</em>, <em>L. casei</em>, <em>L. delbrueckii</em> subsp. <em>L. bulgaricus</em>, and <em>L. rhamnosus</em></td>
<td>Add-on probiotic therapy was more effective than budesonide alone with SNOT-22</td>
</tr>
<tr>
<td>Xu et al</td>
<td>2016</td>
<td>R, PC</td>
<td><em>C. butyricum</em></td>
<td>Add-on probiotic therapy enhanced SCIT in patients with pAR (dm) with nasal symptoms, specific IgE</td>
</tr>
<tr>
<td>Jerzynska et al</td>
<td>2016</td>
<td>R, PC, DB</td>
<td><em>L. rhamnosus</em> GG</td>
<td>Add-on probiotic therapy enhanced SLIT in children with AR with decreased medication-symptom score</td>
</tr>
</tbody>
</table>

Bifidobacteria (B), Lactobacillus (L), Clostridium (C)

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**Whole Systems / Traditional Medicine**
Traditional Chinese Medicine (TCM) & Asthma

- Dates back over 2000 yrs in Asia and Far East
- Principle Qi as life-force balance
- Herbal medicines as “natural,” meant to be harmless

3 main patterns of Asthma:
- Cold-induced/flu
- Heat-induced/inflamed
- Wind-related/Allergy

Loosely mimics heterogeneity of specific asthma phenotypes/endotypes

TCM decoctions vary based on type of asthma and meridians, often with overlap and difficult to study


East Asian Herbal in Allergic Rhinitis

- Cheong-Ryong-Tang (SCRT): 8 herb-mixed traditional formula for nasal and respiratory symptoms
- Kang, SJ et al (2020): SCRT inhibits mast cell degranulation, basophils differentiation, eos proliferation

- Kim et al: PC-RCT in adults w/ perennial AR:
  - SCRT 3g after each meal TID X 4 weeks
  - Improved rhinorrhea, congestion, itching, sneezing and QoL at 4 weeks compared to placebo (p <0.05)
  - No significant adverse effects (liver, renal, etc)
  - Placebo group had significant increased IL-4 levels

Take-home: Clinical improvement in AR with possible TH2 modulating effect

Kim MH et al. Complement Ther Med, 2019
Acupuncture in Allergic Rhinitis

• Reports to frequently improve symptoms and quality of life in AR
• 2020 Rhinitis Practice Parameters (Dykewicz et al): “.....lack of standardized acupuncture protocols, lack of standardized outcome evaluations, methodological deficiencies, and small trial numbers.”
• Kahn et al (2020): meta-analysis of acupuncture in allergic rhinitis, of which 13 studies met criteria of quality criteria in allergic rhinitis and several showed significant QoL improvement after 12 weeks
  • Recognized that many studies contain design flaws including outcome assessment
  • Identified as a safe non-pharmaceutical treatment option for AR

• Take-home: Possible role of acupuncture to enhance QoL in AR, particularly as a safe and potentially cost-saving option for AR sufferers
  • More high-quality studies needed

Acupressure in Asthma & Allergic Rhinitis

• Use of pressure points correlating to meridians to promote opening of energy channels to restore Qi

• Liang et al (2017) conducted a meta-analysis where they reviewed 186 studies of which only four of met the inclusion criteria:
  • Two for allergic rhinitis; two for asthma
  • Significant heterogeneity and no meaningful conclusions
  • At best may replace nasal decongestant

• Take-home: Limited data, potential role for isolated nasal congestion
  • May be a safe option as add-on with acupuncture
Mind-Body and Exercise

Limbs of Yoga

Patanjali Yoga Sutras:

- **Yama** - will power, restraints, vows, external disciplines, abstinences, avoidances, things to not do.
- **Niyama** - observances, intentional right practices, the laws to be observed, things to do.
- **Asana** - right posture in body, steadiness in posture, bearing, poise, attitude.
- **Pranayama** - breath expansion, liberation of prana, expansion of flow of prana.
- **Pratyahara** - internalization of attention, the expansion and contraction of psychic energy, sense withdrawal, avoidance of reaction to external stimuli.
- **Dharana** - concentration, fixation of attention, focused attention to exclusion of all else.
- **Dhyana** - meditation, continuous flow of single pointed attention until expansion of consciousness occurs.
- **Samadhi** - liberation, self-realization, absorption or super-conscious state, transformation of individual conscious into universal consciousness, transcendence of consciousness.

Dr. Vasant Lad courtesy of AWCIM, accessed 2020
Yogic Breathing and Asthma

- Kapalabhati includes deep exhalational breathing as a forced and intentional process while sitting upright
  - “Skull-shining” breath; may have benefits for skin and eczema
- Raghavendra et al: Single-center RCT at inpatient yoga facility in India
  - 60 asthmatics mean age 31.5 years (range of 20 to 50), randomized to 10 minutes x 2 of either:
    - Kapalabhati practice with 30s pause between intervals
    - Deep breathing of 6 breaths per minute with awareness on the breath and nostril breathing
- Excluded severe asthma with FEV1 <60%, and prior history of abdominal or thoracic surgery

Kapalabhati and Lung Function in Asthma

- Assessments were performed before and immediately after the breathing interventions
- Forced exhalation group showed change in lung function not seen in deep breathing group:
  - \( \text{FEV1} \): 1.91L to 2.12L \((p<0.05)\)
  - \( \text{FVC} \): 2.62L to 2.70L \((p<0.001)\)
  - \( \text{FEV1/FVC ratio} \): 0.75 to 0.80 \((p<0.05)\)
- Demonstrate acute effect of kapalabhati and reversibility in adult asthma cohort
- Take-home: Warrants further and repeated evaluation with education to self-perform and impact on long-term asthma lung function and asthma control
Mindfulness Based Stress Reduction (MBSR) in Asthma

- Pbert et al: RCT of MBSR compared to Healthy Living Course over 8 weeks
  - At 12 months: Significant improvements in QoL, perceived stress and asthmatics rated as well-controlled
  - No significant effect on lung function (PEF and FEV1)
- Lack et al reviewed 11 studies from 1990 to 2020 of mindfulness or yoga in pediatric asthma
  - Wide range of study designs that suggested improved anxiety, QoL and possibly lung function, mostly in yoga
  - Mindfulness alone studies suggested lower rate of wheezing and coughing attributed to stress

- Take-home: Mindfulness practices aid with long-term asthma control and concomitant stress

Physical Activity in Asthma

- Meta-analysis evaluating effect of physical activity on adult asthma outcomes.
  - Of >11,000 studies, 20 studies met inclusion criteria.
  - 75% of these show physical activity improves asthma control, quality of life, or lung function
  - Possible benefit on inflammatory markers
- No worsened outcomes of asthma control

Take-home: Promote physical activity but more specific recommendations on type needed

* TABLE II. Results of included studies *

<table>
<thead>
<tr>
<th>Study</th>
<th>Lung function</th>
<th>Asthma control</th>
<th>Health-related quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abidi et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Barstow et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Bird et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Breaton et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Chippindale et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Gloe et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Harlow et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Meric et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
</tr>
<tr>
<td>Paul and O’Brien (2019)</td>
<td>+</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Raiff et al. (2019)</td>
<td>+</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Rose et al. (2019)</td>
<td>+</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Sittichai et al. (2019)</td>
<td>+</td>
<td>+</td>
<td>N</td>
</tr>
<tr>
<td>Smith et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Tabor et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
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<tr>
<td>Tenor et al. (2019)</td>
<td>N</td>
<td>+</td>
<td>N</td>
</tr>
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</table>

Aerobic Exercise and Asthma control

- Evaristo el al (2020): 54 asthmatics randomized into either Aerobic training or Breathing group for **12 weeks with 40-minute sessions 2x/week**
  - Aerobic group: Treadmill exercise
  - Breathing group: Pranayama practice (nasal and diaphragmatic)
  - All patients underwent asthma education program
- Both interventions showed statistical improvement in control and inflammation but not other QoL assessments
- At 3 month follow up, Aerobic group **2.6 times more likely** to have clinical improvement and less days of rescue medication
- Take-home: Structured aerobic exercise should be encouraged as additional tool to improve asthma control

Summary

- The microbiome appears to be a key linchpin in the risk of asthma, eczema and co-management of allergic rhinitis
- Botanicals through dietary sources or nutraceuticals seem to have a role in atopic disease including allergic rhinitis and asthma
- Exercise physiology, breathwork and mindfulness have a favorable role in patients with asthma and need more standardization
- Whole systems and traditional practices suggest benefit in asthma and allergic rhinitis but lack systemic studies and reproducibility
- Overall, studies of integrative practices are limited but emerging; more attention and focus on these areas are needed
Closing Thought: Integrative Integration

- Multidisciplinary Care
- Shared decision-making
- Telemedicine and Technological resources
- Pharmaceutical and Insurance-driven
- Cost-Effectiveness and Access to Care

Acknowledgments:
ACAAI Annual Meeting/Integrative Medicine Committee
University of Arizona Department of Medicine
Andrew Weil Center for Integrative Medicine &
Countless Patients and Colleagues for their support