

Myelodysplastic Syndrome and Hemoglobin Improved by Intravenous Nutrient Therapy: A Case Report

Onkar Singh, ND ^(1,2), Mary-Leah Albano, MPH, ND ⁽¹⁾, Felicia Scaringi, CCNM Student ⁽²⁾, Monique Aucoin, ND, MSc ^(2,3)

1. Holistic Healing Arts, ON, Canada; 2. Canadian College of Naturopathic Medicine, ON, Canada; 3. University of Guelph, ON, Canada

Introduction

- Myelodysplastic syndromes (MDSs) are a group of rare bone marrow failure disorders.
- Onset related to genetic predispositions or environmental exposure.
- Clinically manifests as low red blood cells, low white blood cells, low platelets or all three.
- Causes shortness of breath, weakness, fatigue, skin pallor, easy bruising, petechiae and heart palpitations.
- Risk of diagnosis is greatest in 60 y.o. and older, 30% developing into acute myeloid leukemia.
- Hematopoietic stem cell transplantation can be curative.
- Intravenous (IV) administration of vitamin C during cancer treatment has resulted in cancer cell cytotoxicity and improved immunity.
- Currently, there is no research on IV nutrient therapy use in MDS patients.

Objectives

Document a case of low hemoglobin caused by MDS that responded favourably to IV nutrient therapy.

Case Presentation

- A 74-year-old male diagnosed with MDS.
- Symptoms presented with extreme fatigue, shortness of breath, and pallor.
- Hemoglobin was monitored regularly by hematologist.
- With a hemoglobin of 76 g/dL he was not eligible to receive blood transfusions.
- He began treatment with his naturopathic medical team in November 2021 and was then treated weekly or biweekly with IV vitamin/mineral therapy.

Interventions & Outcomes

Table 1. Timeline of Treatment IVs Administered

Timeline of IV Treatment Administered	IV Description	Number of Treatments
Nov 2021	Myer's Cocktail	6
Jan 2022	High Dose Vitamin C 25gm	4
March 2022	Hydrating Myer's Cocktail	13
Sept 2022	Hydrating Myer's Cocktail + Glutathione	16

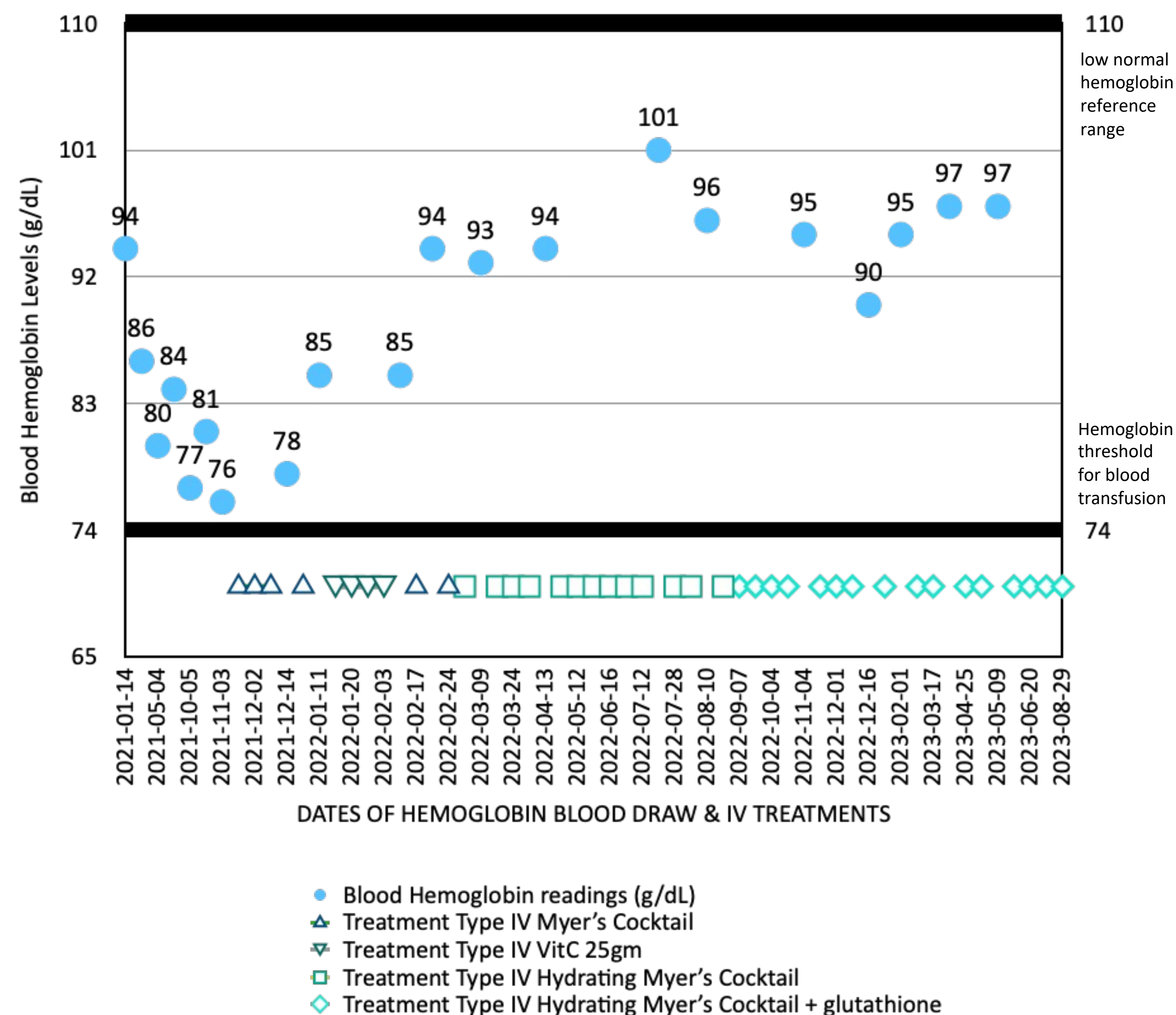


Figure 1. Summary of hemoglobin levels pre & post-IV nutrient treatments

Results

- There was an increase in the patient's hemoglobin levels.
- The patient also reported more energy and reduced shortness of breath.
- Hydrating Myer's infusion appeared to be associated with the greatest hemoglobin increase.
- Hydrating Myer's cocktail was administered based on the hypothesis that it could optimize circulation of nutrients through the bloodstream and into the cells.

Discussions

Strengths:

- IV infusions were the only treatment provided during this time.
- Hemoglobin levels were measured frequently.

Limitations:

- This report only documents the results of one patient.
- Can not confirm a cause-effect relationship.
- Unclear if these results would generalize to other patients.

Conclusions

- This case report documents the beneficial outcome of IV therapy on hemoglobin levels in a patient with MDS.
- **Future Considerations:** Further investigation is warranted to assess the effectiveness of IV therapy on hemoglobin levels in MDS patients with similar prognosis.

Introduction

- 1 in 6 Canadian couples experiences infertility.
- 1/3 of infertility cases are attributed to male partners, 1/3 to female partners and 1/3 to a combination of the two.
- Research has shown that over the past 50 years sperm count has been declining at an accelerated rate globally and approximately 2% of all men will exhibit suboptimal sperm parameters.
- Conventional interventions for male infertility, including IVF, are costly and this financial burden can put serious stress on couples trying to conceive.
- The cause of infertility in men is often multifactorial and may include endocrine disorders, genetic causes, urogenital abnormalities, malignancies, immunological causes, environmental toxins, or may be idiopathic

Objectives

To analyze the effectiveness of carnitine and coenzyme Q10 supplementation on sperm quality parameters in men diagnosed with infertility.

Search Methods

- PubMed and Google Scholar were used to search the literature with the following MeSH terms:
 - (carnitine) AND (sperm)
 - (coenzyme Q10) AND (sperm)
- Studies were limited to randomized control trials (RCTs), systematic reviews and meta-analyses. Only the RCTs not summarized in the meta-analyses were included.
- Animal studies and studies using combinations of nutritional supplements were excluded.

Table 1. PICO framework

Population	Intervention	Outcomes
<ul style="list-style-type: none"> • Adult men • Diagnosis of infertility 	<ul style="list-style-type: none"> • Carnitine vs. placebo • Coenzyme Q10 vs. placebo 	<ul style="list-style-type: none"> • Measures of sperm quality

Results

Table 2. L-Carnitine and L-acetyl-carnitine

Author	Intervention	Comparison	Results
Lenzi et al. (2004)	2g/day L-carnitine and 500mg BID L-acetyl-carnitine was supplemented for 6 months.	Placebo	No significant change was seen in sperm concentration. However, a significant increase in sperm motility was seen.
Balercia et al. (2005)	2g/day L-carnitine and 1g/day L-acetyl-carnitine was supplemented for 6 months.	Placebo	Statistically significant improvements were seen in sperm concentration, motility, straight progressive velocity, and total oxyradical scavenging capacity.
Sigman et al. (2006)	2g/day L-carnitine and 1g/day L-acetyl-carnitine was supplemented for 6 months.	Placebo	At both the 12-week and 24-week analyses, there was a trend toward improvement in sperm concentration and motility, but these results were not statistically significant.

Table 3. Coenzyme Q10

Author	Intervention	Comparison	Results
Nadjarzadeh et al. (2014)	200mg of coenzyme Q10 was supplemented for 3 months.	Placebo	There was no statistically significant change in sperm concentration seen. However, the study did have significant positive results on biomarkers of oxidative stress in seminal plasma, such as catalase, superoxide dismutase (SOD), and 8-isoprostane.
Lafuente et al. (2013)	Coenzyme Q10 supplementation	Placebo	Meta-analysis showed that coenzyme Q10 supplementation resulted in a statistically significant increase in sperm concentration, seminal concentration and sperm motility.
Safarinejad et al. (2012)	200mg/day coenzyme Q10 supplemented for 6 months.	Placebo	A statistically significant increase in sperm concentration, motility and morphology was seen in the coenzyme Q10 treatment group compared to placebo.

Discussions

Mechanism of Action

- Oxidative stress disrupts the integrity of sperm DNA and limits the fertilizing potential of these cells as a result of collateral damage to proteins and lipids in the sperm plasma membrane.
- Antioxidant supplementation has been found to be beneficial in reversing oxidative stress-related sperm dysfunction and improving pregnancy rates.
- The proposed effect of coenzyme Q10 on sperm quality is attributed to its antioxidant properties which are essential in maintaining the energy system of spermatozoa and protecting their membranes from lipid peroxidation.
- Similarly, L-carnitine and acetyl-L-carnitine have a role in managing oxidative stress in sperm by scavenging free radicals, thus protecting from cell membrane and DNA damage.
- They also have roles in the regulation of Sertoli cells, reducing apoptosis of spermatogenic cells and inhibiting sperm aggregation.

Clinical Application

- Although the evidence supporting these interventions is not consistently high and more research is still needed, they have promising benefits and are significantly more cost-effective, safe, well tolerated, and less invasive than the conventional standard of care for male infertility.

Conclusions

Male infertility is a common and complicated multifactorial disorder that should be managed based upon individual presentation and goals. Coenzyme Q10 and carnitines have the potential to be valid recommendations for the treatment of male infertility.

Effectiveness of Plant Sterols/Stanol, Exercise, and the Mediterranean Diet on Serum Cholesterol Levels: A Narrative Review

Cristina Pearce CCNM Student ⁽¹⁾, Adam Gratton, MSc ND ⁽¹⁾

¹ Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- Currently, the only drug class approved for the primary prevention of cardiovascular disease is statins
- They are a first-line option for improving lipid parameters with the potential to reduce low-density lipoprotein (LDL) cholesterol levels by 15-30%
- However, their adverse effects can result in disengagement from therapy and motivate people towards non-drug alternatives

Objective

- This study aimed to appraise the literature for the ability of plant sterols/stanols, exercise, and the Mediterranean diet to alter serum LDL cholesterol levels

Search Methods

Database searched: PubMed using search terms such as “Plant sterols AND serum cholesterol AND adults”, “Exercise vs no treatment AND serum cholesterol AND adults”, “Mediterranean diet vs low fat AND serum cholesterol AND adults”

PICO Framework: (1) population was adults (2) intervention of plant sterols/stanols, exercise, or Mediterranean diet (3) compared to placebo, control (no treatment), or low-fat diet respectively (4) outcome measure of serum cholesterol levels

Search filters applied: only RCTs and meta-analyses - any RCT already summarized in included meta-analyses were excluded

Studies yielded: plant sterols/stanols yielded 23 results, exercise yielded 15 results, and Mediterranean diet yielded 3 results, of which 10 total met all criteria and are summarized in this review

Results

Table 1. Plant Sterols/Stanol

Authors	Intervention	Comparison	Results
Abumweis et al., 2008	Plant sterol/stanol consumption	Placebo	Plant sterol/stanol consumption decreased LDL levels by 0.31mmol/L. Greater decreases were seen in participants with higher baseline LDL levels. Maximal reductions in LDL cholesterol was seen with consumption over 2.5g/day and when incorporated into a fat-based food source (i.e. margarine, mayonnaise, yogurt, milk etc.).
Trautwein et al., 2018	2g/day of plant sterol margarine for 6 weeks	Placebo	Participants within the plant sterol margarine group demonstrated reductions in LDL cholesterol by 0.18 +/- 0.07mmol/L after the 6-week intervention trial.
Weingärtner et al., 2016	3g/day of plant sterol margarine for 4 weeks	Placebo	No statistically significant differences seen between groups with no significant changes in LDL cholesterol.

Table 2. Exercise

Authors	Intervention	Comparison	Results
Moholdt et al., 2021	High-intensity interval training in either morning or evening for 6 days	Control (no treatment)	Morning exercise group achieved a non-statistically significant reduction in LDL of 0.01mmol/L. Evening exercise group demonstrated statistically significant reductions in LDL levels by 0.05mmol/L.
Park et al., 2020	Combined exercise (aerobic and resistance) training for 90-120 min 3x/week for 12 weeks	Control (no treatment)	Exercise group demonstrated post-test LDL cholesterol reductions of 0.24mmol/L.
Rosenkilde et al., 2018	Energy-reduce diet, endurance training (running, cycling, and/or rowing), or energy-reduced diet plus endurance training for 12 weeks	Control (no treatment)	Statistically significant reductions in LDL cholesterol levels were only seen within the endurance training group (-0.6mmol/L) and energy-reduced diet plus endurance training group (-0.6mmol/L).
Zhou et al., 2022	Aerobic training, resistance training, high aerobic training with low resistance training, or high resistance training with low aerobic training for 12 weeks	Control (no treatment)	Reductions in LDL were seen in all groups, but only the high aerobic training with low resistance training group and high resistance training with low aerobic training groups achieved statistically significant reductions (-0.26mmol/L and -0.36mmol/L respectively).

Table 3. Mediterranean Diet (Med Diet)

Authors	Intervention	Comparison	Results
Fito et al., 2007	Med diet with virgin olive oil or Med diet with nuts for 3 months	Low-fat diet	Reductions in LDL cholesterol levels were seen in both Med diet groups but not in the low-fat diet group.
Fortin et al., 2018	Med diet for 6 months	Low-fat diet	Greater non-statistically significant reductions in LDL levels were seen in the Med diet group at post-intervention when compared to low-fat diet group.
Hernández et al., 2017	Med diet with virgin olive oil or Med diet with nuts for 1 year	Low-fat diet	The low-fat diet group demonstrated greater reductions in LDL (-0.23mmol/L) when compared to either Med diet group.

Discussion

Clinical Application

- Greatest effects to serum LDL cholesterol levels may be achieved with:
 - Consuming 2-2.5g/day of plant sterols/stanols within a fat spread or with meals
 - Exercising (endurance training or aerobic + resistance training) in the evening
 - Consuming a Mediterranean diet with virgin olive oil

Safety

- All interventions were well tolerated by participants

Strengths

- All RCTs with one meta-analysis, specific inclusion criteria in majority of research, specific outcome measures were consistent

Limitations

- Small sample sizes, lack of standardization in objective measures, methods of intervention varied, specific sample populations, short intervention phases

Conclusion

Statins remain as the first-line treatment for elevated serum LDL cholesterol levels. However, the use of plant sterols/stanols, exercise, and the Mediterranean diet can serve as valuable tools in aiding the prevention and management of dyslipidemia.

For references or further questions, please email: cpearce@ndnet.ccnm.edu

Evaluation of Curcumin, Moxibustion, and TENS as Treatment Options for Dysmenorrhea: A Narrative Review

Omayma Bouziane, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- Dysmenorrhea is a global health concern with rates increasing worldwide.
- Between 45-93% of menstruating women have dysmenorrhea, and 15% are debilitated for 1-3 days per month.
- Standard care often involves Drug options to help alleviate pain but may have undesired adverse effects or may be contraindicated.
- Dysmenorrhea has an impact on quality of life, physical and mental well-being, sleep and mood, academic and professional performance, and personal relationships.

Objectives

To evaluate evidence for 3 non-drug interventions, curcumin, moxibustion, and transcutaneous electric nerve stimulation (TENS) on pain severity for women with dysmenorrhea.

Search Methods

- PubMed, ScienceDirect, Cochrane database, and Google Scholar were used to search for dysmenorrhea and visual analog scale and either curcumin, moxibustion, or TENS.
- Only studies using placebo or sham control were selected.
- Selected articles were limited to randomized control trials (RCTs), systematic reviews, and meta-analyses. Only the RCTs not summarized in the meta-analyses were included.
- Studies were limited to human studies, only published in English, and included primary or secondary dysmenorrhea.

Table 1. PICO framework

P	Women with Dysmenorrhea		
I	Curcumin	Moxibustion	TENS
C	Placebo	Placebo (sham moxibustion)	Sham
O	Reduction in menstrual pain measured with Visual Analog Scale (VAS)		

- Curcumin yielded 211 studies, 3 of which met PICO criteria.
- Moxibustion yielded 76 studies, 4 of which met PICO criteria.
- TENS yielded 109 studies, 8 of which met PICO criteria.
- For this review, 9 studies total were chosen

Results

Table 2. Curcumin vs Placebo

Authors	Intervention	Comparison	Results
Tabari et al. 2020	2 capsules of 500mg with meals (3g/day) turmeric extract during first 3 days of menstruation for 2 months	Placebo	3g/d Curcumin was significantly effective in reducing VAS pain severity and duration 3h after consumption.
Bahrami et al. 2021	1 CUR pill per day (500mg of curcuminoid + 5mg piperine), from 7 days before menstruation until 3rd day, for 3 consecutive cycles.	Placebo	500mg/d Curcumin reduced VAS pain severity for dysmenorrhea, and improved PMS symptoms. The improvement was higher than placebo but not statistically significant.
Hesami S et al. 2021	1 capsule of 500mg powdered turmeric during from 2 days before menstruation until 3rd day, during 8-week intervention	Placebo	500mg/d powdered turmeric reduced pain intensity measured by VAS. The improvement was higher than placebo but not statistically significant.

Table 3. Moxibustion vs placebo moxibustion

Authors	Intervention	Comparison	Results
Liu et al. 2019	1 herb partitioned moxibustion cone burned on CV4 and CV8 for 20min, once a day, 5 days before and first 2 days of menstruation, for 3 cycles.	Placebo-partitioned moxibustion cone	Herb-partitioned moxibustion reduced VAS pain severity for dysmenorrhea at 3 months. The improvement was higher than placebo and statistically significant. The VAS pain severity was further reduced at 6 months follow-up while placebo significantly increased.
Jing et al. 2015	1 moxa cone burned on CV4 and CV8 for 20min once a day, 5-7 days before menstruation, for 2 cycles.	Placebo moxibustion	Moxibustion produced a statistically significant reduction in VAS pain severity by the second menstrual cycle.
Yan et al. 2023*	24 RCT involving 2614 participants analyzed for navel therapy on CV8	placebo moxibustion	all interventions of navel therapy including moxibustion, herbal patching or combined on CV8 produced a statistically significant reduction in VAS pain severity for patients with dysmenorrhea

Table 4. Transcutaneous electrical nerve stimulation (TENS) vs sham TENS

Authors	Intervention	Comparison	Results
Arik et al. 2022*	3 RCTs and 1 RCT crossover totaling 260 patients analyzed for TENS.	Sham TENS	All studies showed that TENS intervention reduced pain in patients with dysmenorrhea as measure by VAS, and that it was statistically significant when compared to Sham TENS.
Guy et al. 2022	TENS used with bearable painless intensity, for 30min, that could be repeated up to 6 times per day.	Sham TENS	This study showed that TENS reduced pain in patients with primary dysmenorrhea as measured by VAS, and that it was statistically significant when compared to Sham TENS. In 74% cases, TENS produced a significant pain relief within the first 20min, with a longer time for reappearance of pain after application for up to 3h40min for half TENS users.
Camilo et al. 2023	TENS for 35min once per cycle up to 6 hours after onset of initial pain	Sham TENS	TENS produced a statistically significant reduction in VAS pain severity. This was done during a single 35min treatment up to 6 hours after onset of first pain of the menstrual cycle. It was administered by a researcher who adjusted electrode placement, amplitude, and frequency, to reach analgesic effect during the session. The analgesic effect lasted an average of 8h post administration.

*Systematic review with meta-analysis

Discussions

Strengths & Limitations

- Curcumin, moxibustion, and TENS studies were all double-blinded and placebo/sham-controlled which increased study quality.
- Curcumin studies differed in dosage, duration of administration, and outcomes. Studies had very restrictive inclusion and exclusion criteria and a short period for the trials. Only one study showed a statistically significant reduction in VAS at 3g/d.
- Studies with larger sample sizes, different doses, longer duration and follow-up, with wider inclusion criteria would be beneficial.
- Moxibustion studies showed statistically significant improvement. One of the studies showed benefits lasting 3 months after the trial, indicating a need for studies with follow-up after 6 and 12 months to fully evaluate the effects of moxibustion.
- All three TENS studies showed statistically significant improvement. Though true blinding can't be achieved with sham. Frequencies, duration, and placement of electrodes differed between the trials. Overall, TENS helped reduce VAS severity and achieve analgesia for up to 3h 40min. This indicates a need for further studies to standardize TENS parameters and placement of electrodes.

Clinical Application

- All interventions can be used stand-alone or in tandem alongside standard care, and all three have low side effects. Further research is needed to standardize curcumin dose and treatment window, moxibustion frequency and follow-up periods, and TENS electrode placement for dysmenorrhea relief.

Conclusions

Curcumin, moxibustion and TENS are viable options to help with dysmenorrhea pain severity and duration.

For references or further questions, please email: obouziane@ndnet.ccnm.edu

Vitamin D and Probiotics for the Treatment of Atopic Dermatitis in Children: A Narrative Review

Jeanette Titus, HBSc, CCNM student ⁽¹⁾, Adam Gratton, MSc, ND⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada

Introduction

- Atopic dermatitis (AD) is a persistent and chronic itchy skin condition that can severely impact quality of life.
- The prevalence of AD in children is 10-20%, costing \$1.4 billion annually with the prevalence increasing in industrialized countries.
- While corticosteroids and other topical and systemic agents can be effective, they are not free of adverse effects. With the prevalence of corticosteroid phobia, many seek alternative methods of treatment.

Objectives

This study aims to appraise the evidence for two specific non-drug interventions; vitamin D and probiotics.

Search Methods

- PICO criteria were defined before conducting the literature search and are summarized in Table 1.
- The outcome measure was a change in Scoring Atopic Dermatitis (SCORAD) or the Eczema Area and Severity Index (EASI).
- The search was limited to randomized control trials (RCT) and meta-analyses in the PubMed database. The human filter was applied with the date restriction set to include studies from 2015-2023. Only RCTs not summarized in included meta-analyses were included.
- The literature search for Vitamin D supplementation yielded 23 results, of which 2 RCTs and 1 meta-analysis met the criteria. Probiotic supplementation yielded 41 results of which 2 RCTs and 1 meta-analysis met the criteria.

Table 1. PICO Framework

Population	Interventions	Control	Outcomes
Children with AD	<ul style="list-style-type: none"> • Vitamin D • Probiotics 	Placebo	Change in SCORAD or EASI

Results

Table 2. Probiotics

Authors	Intervention	Comparison	Results
Jiang et al., 2020	This study looked at RCTs evaluating the effect of probiotics on AD (prevention or treatment).	Placebo	Meta-analysis of the ten treatment studies showed a statistically significant decrease in SCORAD in the probiotics group compared with the control group. Subgroup analysis showed that single-strain and mixed-strain probiotics both improved SCORAD values (statistically significant).
Carucci et al., 2022	100 AD children aged 6–36 months received placebo or <i>Lactocaseibacillus rhamnosus</i> GG (LGG) for 12 weeks. The primary outcome looked at was LGG supplementation on AD severity (SCORAD) at baseline and at 3 months).	Placebo	The meaningful clinical important difference (MCID) at week 12 was significantly higher in the probiotic group. A faster decrease in SCORAD was shown in the probiotic group, and more participants saw an improvement in SCORAD in the probiotic group
Wang et al., 2015	200 children aged 1-18 years old with moderate to severe AD received either <i>Lactobacillus paracasei</i> (LP), <i>Lactobacillus fermentum</i> (LF), and a LP LF mixture or placebo for 3 months. The SCORAD was taken at baseline and after 3 months	Placebo	The SCORAD was reduced in each group, but it was lower in the LF, LP and LF+LP group compared to placebo at 3 months (statistically significant). SCORAD did not increase after ending the probiotic supplementation.

Table 3. Vitamin D

Authors	Intervention	Comparison	Results
Hattangdi-Haridas et al., 2019	This study looked at RCTs evaluating the effect of Vitamin D on AD (status and supplementation).	Placebo	For all RCT's, there was a highly significant reduction in SCORAD by 11 points from intervention with vitamin D with a mean dose of 1600IU per day.
Galli et al., 2015	Patients were divided into two groups according to the state of sensitization (IgE vs non-IgE mediated) The participants were randomized and then the enrolled children were assigned to the supplementation group, which received a daily oral Vitamin D3 supplementation (2000 IUs) daily for 3 months, or a control group which received no supplementation.	Placebo	Vitamin D levels in severe eczema, were not statistically different from Vitamin D concentration in mild eczema. Vitamin D3 supplementation did not influence the SCORAD severity or the total IgEs concentration but did increase serum vitamin D levels.
Lara-Corrales et al., 2019	45 patients were randomized to either VD supplementation of 2000 IU/day or placebo. SCORAD was measured at baseline and then 3 months after supplementation	Placebo	At 3-month follow up, there was a mean SCORAD decrease of 15.35 in the Vitamin D supplementation group, and 15.13 for the placebo group. The authors concluded that AD severity is inversely correlated with serum vitamin D levels, however, they did not find an improvement of AD severity with supplementation of 2000IU/day for 3 months.

Discussions

Strengths

- All studies were recent (within the last 10 years), placebo-controlled, and blinded. Vitamin D studies looked at baseline vitamin D levels and AD severity, as well as changes after supplementation. The probiotic studies had large sample sizes.

Limitations

- Duration, age group, dose, and strains differed for both vitamin D and probiotic interventions. Rescue corticosteroid and emollient use was permitted in some trials.

Mechanism of action

- The mechanism of action of AD is multi-faceted, with skin barrier disruption, overreaction of the Th2 immune system, and hyperreactivity to allergens playing a role.

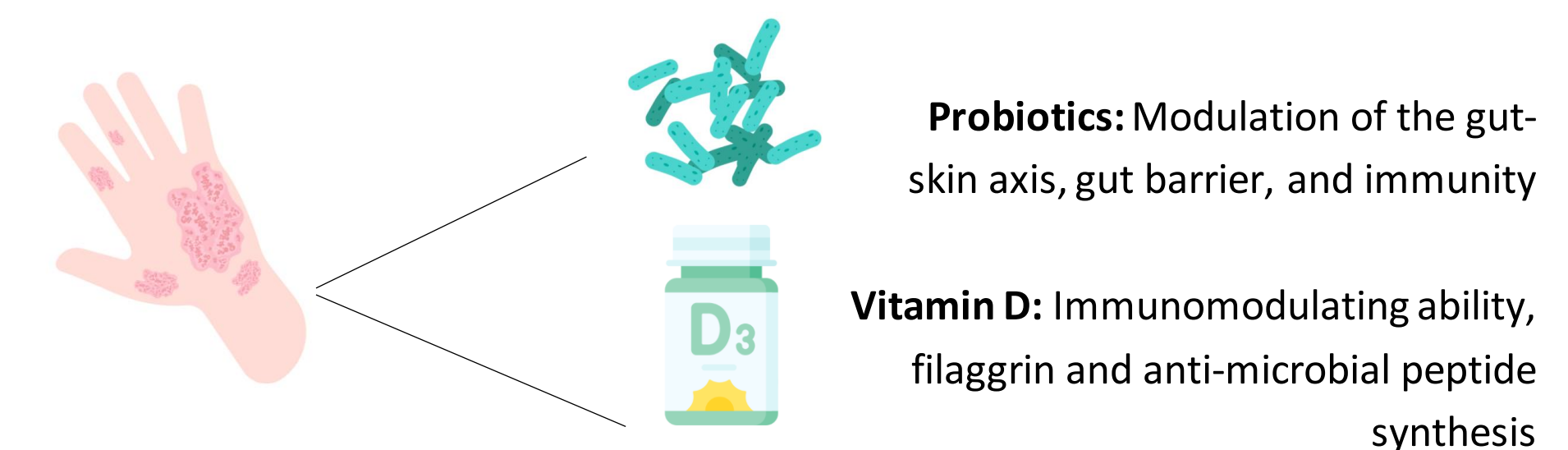


Figure 1: Mechanism of action of natural therapies

Clinical Application

- **Probiotics:** Practitioners can consider prescribing mixed-strain probiotics containing LP, LF, and LGG within a multi-strain probiotic for the treatment of AD and the maintenance of overall health in children.
- **Vitamin D:** Consider supplementing Vitamin D in children who are deficient.

Conclusions

Probiotics may be a viable treatment option for AD in children, however, more research on the benefits of specific strains for this condition is needed. The research presented here does not support vitamin D supplementation for AD in children. More studies with dose and duration standardization are needed.

Assessing the Effects of Cold-Water Immersion, Acupuncture, and Branched-Chain Amino Acid Supplementation on Delayed Onset Muscle Soreness: A Narrative Review

Skylar Tierney, BSc, CCNM Student⁽¹⁾ & Adam Gratton, MSc, ND⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- Delayed-onset muscle soreness (DOMS) is a mild, self-limited muscle injury that results from disruption of the perimysium following eccentric or new types of exercise.
- Perceived muscle soreness may reduce range of motion and cause biomechanical problems, ultimately decreasing efficiency and increasing risk of injury.
- DOMS is one of the most common causes of compromised performance in sport.
- Cold-water immersion (CWI), acupuncture, and branched-chain amino acid (BCAA) supplementation are commonly practiced by athletes under the notion they mitigate muscle damage and accelerate recovery.

Objectives

This study aimed to evaluate the efficacy of interventions commonly used in sports to reduce subjective reports of post-exercise muscle soreness to allow for superior athletic performance.

Search Methods

- Separate literature searches were conducted for each intervention using PubMed and ScienceDirect, limiting searches to include systematic reviews, meta-analyses, and clinical trials.
- Databases were used to search for “delayed onset muscle soreness AND cold-water immersion,” “delayed onset muscle soreness AND acupuncture,” and “delayed onset muscle soreness AND branched-chain amino acids.”
- The literature search for cold water immersion yielded 115 results, acupuncture yielded 93 results, and BCAAs yielded 47 results, of which 9 total studies met all criteria and are summarized in this study.

Table 1: PICO framework

Population	Intervention	Outcomes
• Non-injured adults after a bout of exercise	• Cold water immersion • Acupuncture • BCAA supplementation	• Subjective reporting of muscle soreness, measured by a visual analogue scale (VAS)

Results

Table 2. Summary of Evidence for Cold Water Immersion

Authors	Intervention	Comparison	Results
Hohenauer et al, 2015*	13 RCTs analyzed cold therapies of various temperatures and durations, including CWI, cold air, and cold pack, applied externally immediately following a bout of exercise.	Passive rest	Cooling reduced DOMS 24 hours after application significantly compared to passive rest controls. Subgroup analysis for different cooling methods found CWI to significantly improve DOMS compared to other cold therapies up to 96 hours.
Glasgow et al, 2014	Short contrast, short intermittent, 10 min in 10°C, and 10 min in 6°C with immersion up to waist level in standing position following standing hamstring curls.	Passive rest	No significant differences in DOMS were found in any group compared to control. The largest effect sizes at 48h and 72h post-exercise favoured 10 min CWI in 6°C, as well this was the only group to report no muscle soreness at 96h post-exercise.
Adamczyk et al, 2016	Ice massage or CWI (3 min at 8°C) following jump squats.	Passive rest	At 48h, the CWI group experienced the greatest reduction in DOMS compared to ice massage and passive rest.

Table 3. Summary of Evidence for Acupuncture

Authors	Intervention	Comparison	Results
Huang et al, 2020*	6 RCTs analyzed for the effect of acupuncture on DOMS. In all studies needles were retained for 10-20 min.	No treatment	Overall, acupuncture intervention significantly reduced DOMS compared to control. A significant reduction was observed at 24h and 72h post-exercise compared to control, with a slight improvement at 48h.
Antonassi et al, 2020	LI4, LI11, St36, and GB34 needled 24 hours following exercise and retained for 20 min. Upon removal, skin was cleaned, tape was placed over points. Participants remained laying for 10 additional minutes.	No treatment & sham	The acupuncture group experienced a significant reduction in DOMS immediately following the intervention compared to both sham and control groups.
Cardoso et al, 2020	St34, St36, and Lr3 needled 5 times to evoke bleeding at each point following an isometric squat, repeated after 24h.	No treatment & sham	Acupuncture significantly improved acute muscle soreness by half and DOMS by a third, with no significant differences in DOMS among sham or control groups.

Table 4. Summary of Evidence for Branched-Chain Amino Acids

Authors	Intervention	Comparison	Results
Rahimi et al, 2017*	8 RCTs analyzed for the effects of BCAAs on DOMS. In all studies, BCAAs were given before and immediately after exercise.	Placebo	While no statistically significant differences were observed at 24, 48, 72, or 96 hour follow up times, BCAAs overall were found to significantly improve DOMS. Appears that supplementation 7 days prior to, the day of, and on days following exercise is most appropriate for reducing DOMS.
VanDusseldorp et al, 2018	0.22g BCAA/kg body weight/day given for a total of 8 days, with exercise performed on day 5.	Placebo	The BCAA group had a statistically significant improvement in muscle soreness at 48h and 72h follow ups compared to placebo. While not statistically significant, BCAA group had lower VAS scores across all time points.
Dorrell & Gee, 2016	6g or 18g BCAA 20 min prior to and immediately following high intensity strength training session.	Placebo	BCAA in 6g or 18g doses both found to significantly reduce muscle soreness compared to placebo. 18g dose found to significantly reduce DOMS beyond that of 6g dosing.

*Systematic review with meta-analysis

Discussions

Strengths

- The studies summarized among each intervention used different methodologies, providing insight into optimal dosing strategies beyond the overall efficacy of treatments

Limitations

- Small sample sizes may not accurately represent the general population, as well as potentially underpowering the findings
- Many of the CWI and BCAA studies only used male participants, limiting the applicability of findings to men

Clinical Application

- Time to maximal benefit must be considered when using cold water immersion to treat DOMS, with peak effects observed at 48h post-intervention.
- Acupuncture is unique to the other interventions in that it provides a reduction in DOMS immediately following treatment, making it the most appropriate intervention for those needing to return to sport in optimal form as soon as possible.
- Maximum benefit with BCAA supplementation is achieved with 0.22 g/kg body weight taken before and after resistance exercise.

Future Directions

- Future studies are needed to determine the optimal temperature and duration of CWI for female athletes.
- Future studies are needed to explore the ceiling of the dose-response relationship between BCAA and DOMS.

Conclusions

The existing literature indicates that cold water immersion, acupuncture, and BCAA supplementation are appropriate interventions to prevent and treat DOMS. The interventions decrease DOMS by varying mechanisms, showing potential for synergistic effects when used in combination.

For references or further questions, please email: stierney@ndnet.ccnm.edu

Evaluating Oral Supplementation of Zinc for Chemotherapy- and Radiation-Induced Oral Mucositis: A Narrative Review

Loreal Legare, CCNM Student ⁽¹⁾, Jason Clifford, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine Toronto Campus, Toronto ON, Canada



Introduction

- Oral mucositis (OM) creates painful inflammation and ulcerations of the oral mucosa, and is a common side effect of chemotherapy and radiation therapy.
- OM should heal after treatment has concluded, but it can last for 2-12 weeks, affecting patients' nutrition and quality of life.
- Standard care includes topical and oral pharmaceutical interventions, and changes to oral hygiene practices.
- Zinc, an essential nutrient in our body, enhances the immune system, cell signaling, and has been shown to have a relationship with wound healing.

Objectives

To evaluate evidence on the effect of zinc for chemotherapy and radiation-induced OM.

Search Methods

Search databases included: PubMed and Cochrane Library.

- Articles were limited to randomized controlled trials (RCTs), meta-analysis, and published in English.
- The literature search for zinc yielded 41 results from PubMed and 4 from Cochrane Library, of which 6 RCTs and 1 meta-analysis met the criteria.
- The Cochrane Library search was limited to 2018-2023 as the last meta-analysis covered evidence up to 2017.
- Only RCTs not included in the meta-analysis were summarized in this review.

PICO framework

P	Adults at risk of developing OM due to chemotherapy or radiation therapy
I	Zinc (any form)
C	Placebo
O	Reduction in the severity/grading of OM

Results

Table 1. Zinc

Authors	Intervention	Control	Results
Chaitanya NC, Shugufta K, Suvarna C, et al., 2019	10 studies (total n = 593) included 25-220mg of zinc in capsule, 0.2% mouthwash, or 0.5g zinc granules dissolved in 5% sodium alginate, form.	Placebo	<ul style="list-style-type: none"> 8 studies showed that zinc had a positive effect at reducing the severity of OM, but not in preventing it. 2 studies showed no statistical significance. Overall SMD of -0.89. Study limitations reduce certainty of the result.
Sahebnasagh M, et al. 2023	33 participants undergoing radiotherapy (30Gy dose) were given either 1% zinc sulfate or placebo mouthwash for 6 weeks. Participants were informed to rinse their mouth for 60 seconds 3x/day with 5ml of mouthwash each day of their radiotherapy treatment and continuing to do so for 6 weeks. OM was assessed using the World Health Organization (WHO) and Oral Mucositis Assessment Scale (OMAS) grading scales each week for 7 weeks.	Placebo	<ul style="list-style-type: none"> The zinc sulfate group showed reduced OM scores during weeks 2-7. Participants in the placebo group had more cases of grade 3 OM. No participants in either group experienced grade 4 OM. Adverse effects were not reported.
Mohammadi F, et al., 2022	96 participants undergoing chemotherapy were given a 0.2% zinc chloride mouthwash or placebo and assessed at baseline and at 3 weeks. Participants were instructed to rinse their mouths twice every 8 hours with 7.5mL of mouthwash for two minutes, with 15 minutes in-between each rinse.	Placebo	<ul style="list-style-type: none"> The severity of OM was reduced in the zinc group during week 3 (p=0.001) compared to the placebo group (p=0.62). Zinc chloride is effective in reducing the severity and incidence of OM. No adverse effects were seen.
Oshvandi K, et al., 2021	96 participants undergoing chemotherapy were given 7.5mL of 0.2% zinc chloride or placebo as mouthwash. OM grading was assessed weekly for 3 weeks using the WHO grading scale.	Placebo	<ul style="list-style-type: none"> Prevalence grades of OM in the two groups showed a notable difference in 3 weeks (p<0.046), (p<0.01), and (p<0.01), respectively. No OM was present during the first week, one participant had grade 2 during week two, and two patients had grade 3 during week three. No adverse effects were reported, but weight was evaluated during the trial and found that zinc chloride improved weight in participants.
Rambod M, et al., 2018	86 participants undergoing chemotherapy were given 50mg of zinc sulfate or placebo capsules and instructed to take them 3x/day for 14 days starting on day 1 of treatment. OM was measured using the WHO grading scale and the oral mucositis index. OM was assessed during days 4, 7 and 14 of chemotherapy.	Placebo	<ul style="list-style-type: none"> Zinc sulfate reduced the severity and incidence of OM. 75% of participants in the zinc sulfate group showed no signs or symptoms of OM, where the placebo group only had 47.22%. No adverse effects were seen.
Sangthawan D, et al., 2013	144 participants undergoing radiation treatment for neck cancer were given elemental zinc (5mg per cc) or placebo in syrup form, 3x/day at meals, for a total of 150mg per day. They took the syrup on the first day of radiation, and every day of the treatment duration.	Placebo	<ul style="list-style-type: none"> 139 participants completed the study. No significant results were seen between the two groups 6 participants in the intervention group and 10 in the placebo group developed grade 3 OM. Grade 4 OM was not seen in either group. Mild nausea and vomiting were reported in the zinc sulfate group and one participant experienced moderate nausea and vomiting.
Mansouri A, et al., 2012	60 participants undergoing chemotherapy were given zinc sulfate or placebo in capsule form (220mg zinc sulfate capsule, 50mg of zinc elemental). Placebo capsule was lactose monohydrate. Participants were instructed to take it twice a day with 12-h interval, for a total of 100mg of zinc elemental per day.	Placebo	<ul style="list-style-type: none"> No significant results were found between the two groups for duration or severity of OM. No adverse effects were seen.

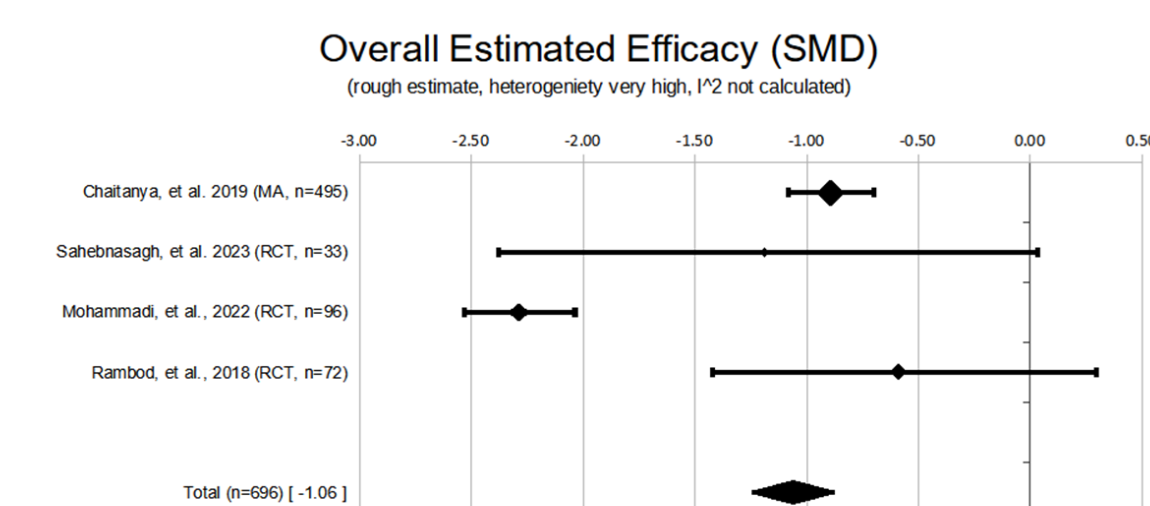


Figure 1. Standardized Mean Difference (SMD) among the trials that provided combinable data.

Study included	Study design	Randomization	Blinding	Withdrawals	Score
Sahebnasagh, et al. 2023	RCT	2	1	0	3
Mohammadi, et al. 2022	RCT	2	1	1	4
Oshvandi, et al. 2021	RCT	2	1	0	3
Rambod, et al. 2018	RCT	2	2	1	5
Sangthawan, et al. 2013	RCT	2	2	1	5
Mansouri, et al. 2012	RCT	2	1	1	4

Figure 2. Jadad Scale of RCTs.

Discussions

Strengths

- Evidence suggests that zinc can be used to limit severity and/or reduce the incidence of chemotherapy and radiation-induced OM.
- The estimated SMD of included studies show statistically significant results, though variance is high.
- Most of the studies, and the combination of all comparable studies, show a significant positive benefit.

Limitations

- Small sample sizes and considerable heterogeneity among studies.
- The meta-analysis was limited by high heterogeneity, the use of a fixed effects model, and noted the presence of publication bias.
- Baseline levels of zinc and participant compliance were not evaluated in most studies.
- Jadad scores show inconsistency in blinding and participant withdrawals.

Clinical Application

- Zinc has shown to be effective in reducing OM severity and is a cost-effective and well tolerated option for patients.
- The mechanism of action is still inconclusive, but the studies note that zinc increases immune system activity and that zinc being present in tissues is important for overall wound healing, which are both beneficial for the treatment of OM.

Conclusions

Multiple pilot studies show a strong potential benefit in using zinc solutions to prevent and treat OM; larger, high-quality clinical trials are needed to confirm these results.

The authors declare no conflict of interest.

For references or further questions, please email: llegare@ndnet.ccnm.edu

Effects of fasting mimetic diets on chemotherapy efficacy and side effects: A Scoping Review

Yousef Sadat Nejad, ND ⁽¹⁾, Olga Calderon CCNM Student ⁽¹⁾, Kieran Cooley, ND (non-clinical) ⁽¹⁻⁴⁾

1. Canadian College of Naturopathic Medicine, ON, Canada 2. University of Technology, Sydney, Australia 3. Southern Cross University, Australia 4 University of Toronto, ON Canada

Introduction

Approximately 250 000 of new cases of cancer were diagnosed in Canada as per the International Agency for Research on Cancer. Many of these cancers are treated with neoadjuvant or adjuvant chemotherapeutic agents as part of antineoplastic therapy. Side effects of these agents are a major cause of dose reductions and pauses in chemotherapy treatment that can result in poorer therapeutic responses and outcomes in these patients. Dietary interventions surrounding chemotherapy have been proposed as adjuncts to mitigate chemotherapy toxicity. A Fasting Mimetic Diet (FMD) is one such intervention that has been associated with reducing adverse events and improving quality of life in patients being treated with chemotherapeutic agents. To help understand the existing evidence base, we conducted a scoping review of FMD as adjunct to chemotherapy.

Objectives

The objective of this review is to analyze current research on FMD surrounding chemotherapy in adult cancer patients, as well as animal and cell models to evaluate the effect of this intervention on chemotherapeutic toxicity, tumor response, side effect mediation and overall patient quality of life.

Search Methods

- PubMed database was reviewed using the following search terms: “cancer”, “oncology”, “fasting mimetic diet”, “chemotherapy”, “chemotherapy side effects”, “efficacy”, “calorie dense diet”.

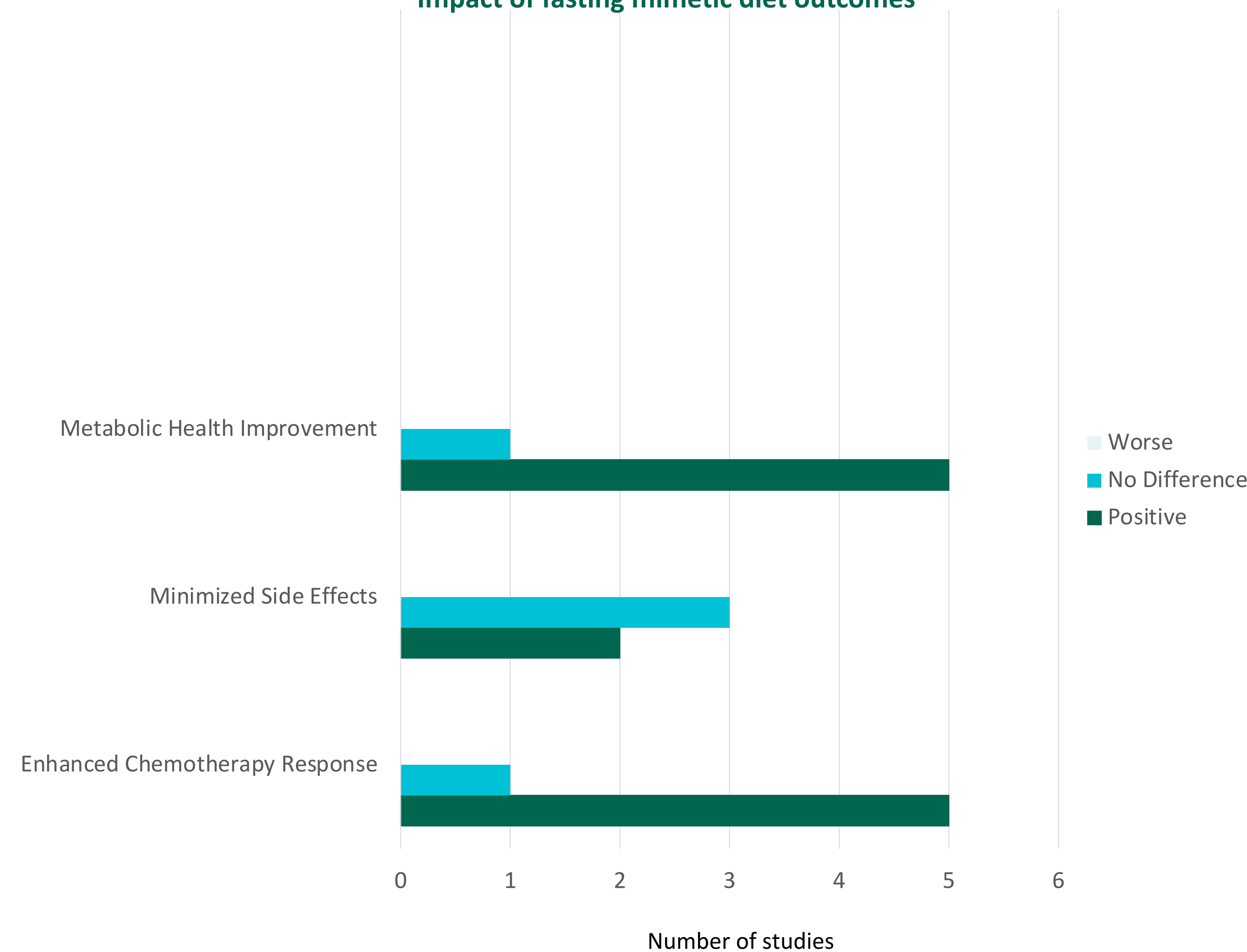
Table 1. PICO framework

Population	Intervention	Outcomes
<ul style="list-style-type: none"> >/ 18 years old Active diagnosis of a malignancy at any stage and all cancer types Malignancy is an initial diagnosis or a recurrence Undergoing current treatment with a chemotherapeutic agent for curative or palliative intent 	<ul style="list-style-type: none"> Fasting Mimetic Diet 	<p>Primary:</p> <ul style="list-style-type: none"> Side effects from chemotherapy <p>Secondary:</p> <ul style="list-style-type: none"> Tumor response Toxicity Quality of life

Results

- A total of 34 results were identified as part of larger scoping review and 16 articles met the criteria for inclusion.
- A vast majority of studies were in human (n = 7, 44%), with the remaining studies involving animals and cell cultures.
- Human evidence shows that cycles of FMD for 4-5 days increased response rate to chemotherapy regime in various cancers .
- Animal and cell culture studies shows that cycles of FMD significantly slowed down tumor growth and reduced tumor size by increasing expression of intratumor caspase3, a molecular marker for apoptosis.
- Three (19%) studies examined the effects of FMD on adverse effect of chemotherapy; all 3 demonstrated some benefit. One animal model study showed reduced cardiotoxicity from chemotherapy and 2 studies in humans showed reduced fatigue and improvement in quality of life

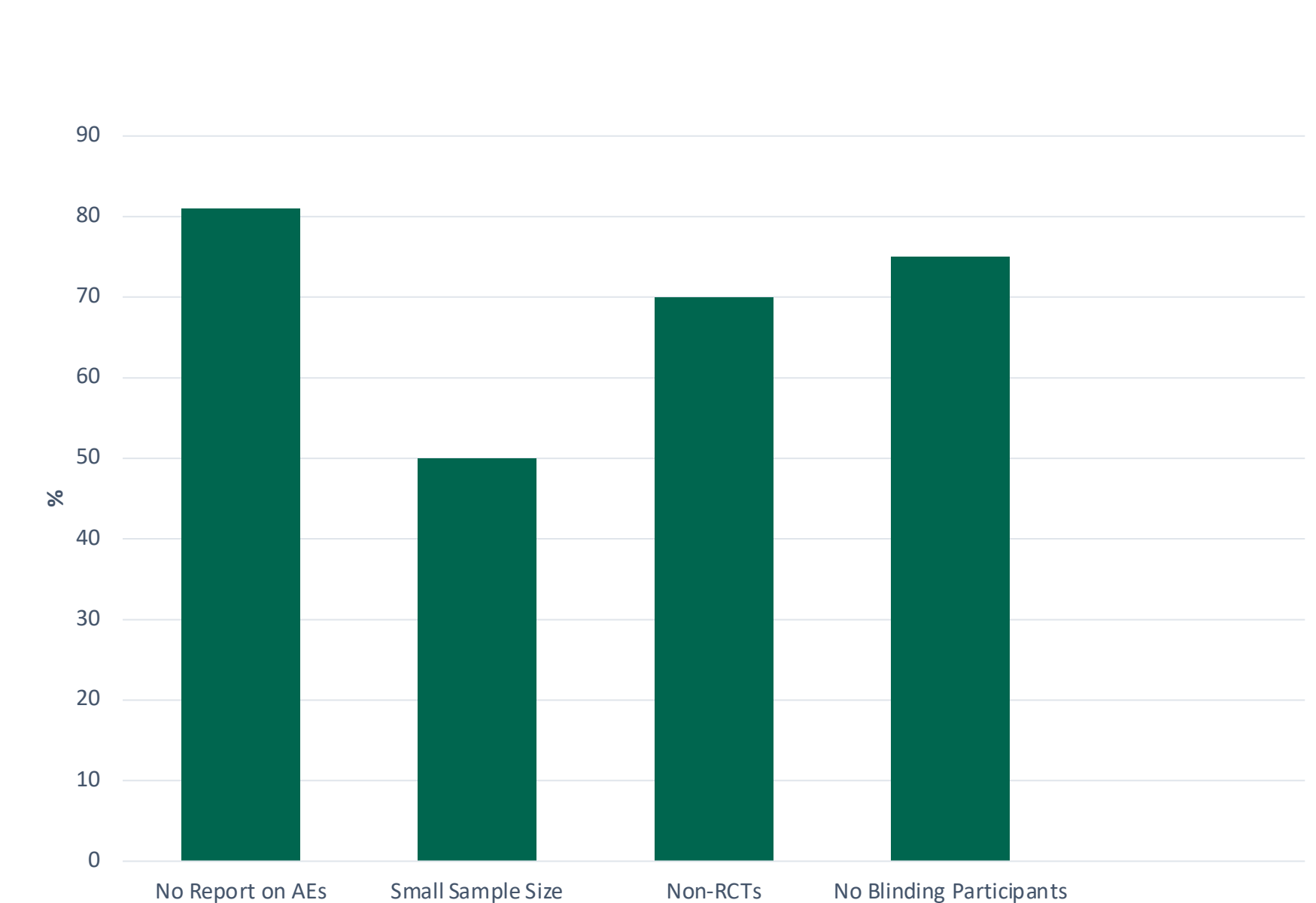
Impact of fasting mimetic diet outcomes



Discussions

- The existing, albeit small, body of evidence suggests there is potential benefit for FMD as an adjunctive therapy to enhance treatment response, reduce adverse effects, and potentially slow tumor progression.
- Despite a mix in study designs in the existing evidence base, the field may benefit from expanding the evidence base to better understand a diverse array of molecular mechanisms and larger, controlled clinical trials.
- The rationale for FMD aligns with the concepts of differential stress resistance (DSR) and differential stress sensitization (DSS) to decrease the toxicity of chemotherapy and improve response rate.

Common Limitations



Conclusions

The evidence from this scoping review suggests that periodic FMD cycles are feasible and can be safely combined with standard chemotherapy treatments in cancer patients at low nutritional risk. FMD cycles in combination with chemotherapy agents can delay cancer growth while reducing side effects. Further research is warranted.

Evaluating Aromatherapy, Exercise and Ginkgo Extract for Behavioural and Psychological Symptoms of Dementia: A Narrative Review

Ava Sturm, CCNM student,⁽¹⁾ Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- 8.4% of Canadians over the age of 65 live with dementia
- Up to 90% of people living with dementia experience behavioural and psychological symptoms (BPSD) throughout the progression of their illness
- Symptoms include agitation, irritability, anxiety, depression, aberrant motor behaviour, and nighttime behaviour
- Current pharmaceutical standards are of modest benefit with many adverse effects
- First-line recommendations include non-pharmacological treatments with no clear guidelines on administration

Objectives

This study aims to evaluate available evidence for three non-pharmacological interventions: aromatherapy, exercise and ginkgo extract for BPSD as measured by the Neuropsychiatric Inventory (NPI).

Search Methods

- PubMed was used to search ginkgo extract AND dementia AND NPI, ginkgo extract AND Alzheimer*, exercise AND dementia and NPI, exercise AND Alzheimer* AND NPI, aromatherapy AND dementia AND NPI, aromatherapy AND Alzheimer* AND NPI
- The studies were refined to systematic reviews with meta-analyses and randomized control trials (RCT). Multiple meta-analyses were used if their studies had minimal cross-over. Individual RCTs could not be used if they were included in the meta-analyses.

Table 1. PICO framework

Population	Intervention	Outcomes
<ul style="list-style-type: none"> • People living with all stages and types of dementia 	<ul style="list-style-type: none"> • Ginkgo extract vs. placebo • Aromatherapy vs placebo inert liquid • Exercise vs. usual care activities 	<ul style="list-style-type: none"> • Change in NPI scores

Results

Table 2. Ginkgo Extract EGb761

Authors	Intervention	Comparison	Results
Tan et. al., 2015*	Ginkgo biloba extract EGb 761 240mg/day for 22-26 weeks	Placebo	Significant reduction in NPI (-2.51, p < 0.00001).
Savaskan et. al., 2018*	Ginkgo biloba extract EGb 761 240mg/day for 22-24 weeks	Placebo	Significant reduction in NPI subscales (p<0.001) for aberrant motor behaviour (-1.05), agitation (-0.82), sleep/nighttime behaviour (-0.78) and anxiety (-0.74).
Ihl et. al., 2012	Ginkgo biloba extract EGb 761 240mg/day for 24 weeks	Placebo	Significant reduction in NPI (-3.1, p<0.001) for people living with Alzheimer's Disease. Significant reductions in NPI (-3.2, p<0.05) for people living with Vascular Dementia

Table 3. Aromatherapy

Authors	Intervention	Comparison	Results
Takahashi et. al., 2020	Cedar leaves added to 50% ethanol solution in diffuser in patient's living space for 8 weeks	Ethanol without added cedar fragrance	Significant reduction in NPI scores (p < 0.05) after 8 weeks. Most notable reductions in agitation, anxiety and irritability (p<0.05).
Watson et. al., 2019	2 drops of lavender essential oil on cloth pinned to patient's collar for 2 hours/day for 14 days	Sunflower oil	Non-significant reduction in NPI irritability subscale (-1.84, p =0.11).
Lin et. al., 2007	Two diffusers with lavender essential oil in living space 1 hour/day for 3 weeks	Sunflower oil	Significant reduction in Chinese NPI scores (p<0.001) for lavender group. NPI subgroups with significant reductions (p<0.01) include agitation, irritability, aberrant motor behavior and nighttime behaviour.

Table 4. Exercise

Authors	Intervention	Comparison	Results
Telenius et. al., 2015	12-week High Intensity Functional Exercise (HIFE) program 2x/week for 50-60 minutes	Activities led by occupational therapists (reading, games, conversation)	Significant reduction in overall NPI (p=0.03) and agitation subscale (p=0.04) after 12 weeks. Significant reduction in agitation remained after a 12-week de-training period (p=0.045).
López-Ortiz et. al., 2021*	4 studies with various exercise forms. Durations varied 2-3 days/week for 12 weeks-12 months.	Usual care activities	Significant NPI reduction from pooled studies (-4.40, p=0.032).
Dimitriou et.al., 2020	30-minute daily walk for 5 days	Aromatherapy and music therapy	No statistical significance between groups or in comparison to baseline.

*Systematic review with meta analysis

Discussions

Strengths

- Ginkgo biloba extract studies were double-blinded, placebo-controlled
- Aromatherapy studies were randomized, placebo-controlled
- All interventions have few safety concerns and minimal adverse effects

Limitations

- Heterogeneity in both aromatherapy and exercise delivery and duration
- Heterogeneity in dementia type – most studies evaluated dementia, but some evaluated sub-types such as Alzheimer's Disease
- Heterogeneity in NPI evaluation – some studies focused on overall NPI, while some focused on NPI subgroups
- Some studies included patients taking pharmaceuticals, while others did not
- Some studies were quite small

Clinical Application

- Statistical significance was demonstrated in 3/3 Ginkgo studies evaluated, 2/3 aromatherapy studies evaluated, and 2/3 exercise studies evaluated
- Clinical significance (NPI reduction ≥ 4) was demonstrated in 1/3 exercise studies, 2/3 aromatherapy studies and 0/3 Ginkgo extract studies
- Interventions can be used alongside standard care
- Further research is needed to standardize exercise requirements and aromatherapy methods of delivery as they relate to specific types of dementia and NPI

Conclusions

Exercise is a viable consideration in the management of BPSD. Ginkgo Extract EGb 761 provides consistent statistically significant improvements in NPI where clinical benefit may not be observed. Aromatherapy provides mixed results, with possible clinical benefits observed through diffusion.

For references or further questions, please email: asturm@ndnet.ccnm.edu

The Role of Olive Oil and its Constituents in Mental Health: A Scoping Review

Monique Aucoin, ND MSc^(1,2), Vanessa Eedy, CCNM student⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada; 2. University of Guelph, ON, Canada

Introduction

- Mental illnesses have detrimental impacts on quality of life.
- There is emerging evidence that the Mediterranean diet may be protective
- Olive oil, a staple in the Mediterranean diet, contains oleic acid (an omega-9 fatty acid), and oleuropein.
- Olive oil is known to have a positive association with cardiovascular disease, type 2 diabetes, and all-cause mortality.
- There is limited experimental research and no prior synthesis on the effects of olive oil on mental health.

Objectives

To systematically search for and synthesize the research on olive oil and mental health in a scoping review.

Search Methods

- PubMed and OVID MEDLINE databases were searched.
- Titles and abstracts were screened independently in duplicate by the two authors using the eligibility criteria.
- Data was extracted using piloted templates. Extraction was completed by one author and checked by the second author.
- Data were analyzed qualitatively to assess trends and gaps for further study.

Table 1. Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
1. Human experimental or observational studies, animal studies, meta-analyses	1. Narrative reviews, editorials, or opinion articles.
2. Delivery of olive oil or one of its constituents (oleic acid, oleuropein) or assessment of intake of olive oil or measurement of tissue levels of constituents	2. Delivery or assessment of olive oil in combination with other fatty acids, nutrients or foods
3. Assessment of any mental health outcome (incidence, severity, or treatment)	
4. Any year of publication, language or publication status	

Results

The PubMed and OVID MEDLINE search yielded 544 and 152 results, respectively. After deduplication, 552 results remained. After full text screening, 32 studies were eligible for inclusion: 4 human experimental, 18 observational and 10 animal studies

Human Intervention Studies

Author	Population	Study Design	Sample Size	Intervention	Outcome of Interest	Results
Foshati et al.	Diagnosed MDD	Double-blind randomized control trial	73	EVOO 25 ml/day for 7.4 weeks	Depression (Beck Depression Inventory II, Hamilton Depression Rating Scale 7)	Improvement
Rus et al.	Diagnosed fibromyalgia	Double-blind randomized control trial	23	EVOO 50 ml/day for 3 weeks	Mental Health Status (Mental Component Score 12, Fibromyalgia Impact Questionnaire)	Improvement
Canheta et al.	Obese individuals	Parallel randomized control trial	129	EVOO 52 ml/day for 12 weeks	Anxiety & Depression (Hospital Anxiety and Depression Scale)	Improvement
Mitsukura et al.	Healthy individuals	Randomized control trial	17	EVOO 15 g for 1 day	Stress (Cerebral blood flow)	Improvement

- All 4 human intervention studies reported improved mental health outcomes

Observational Studies Animal Studies

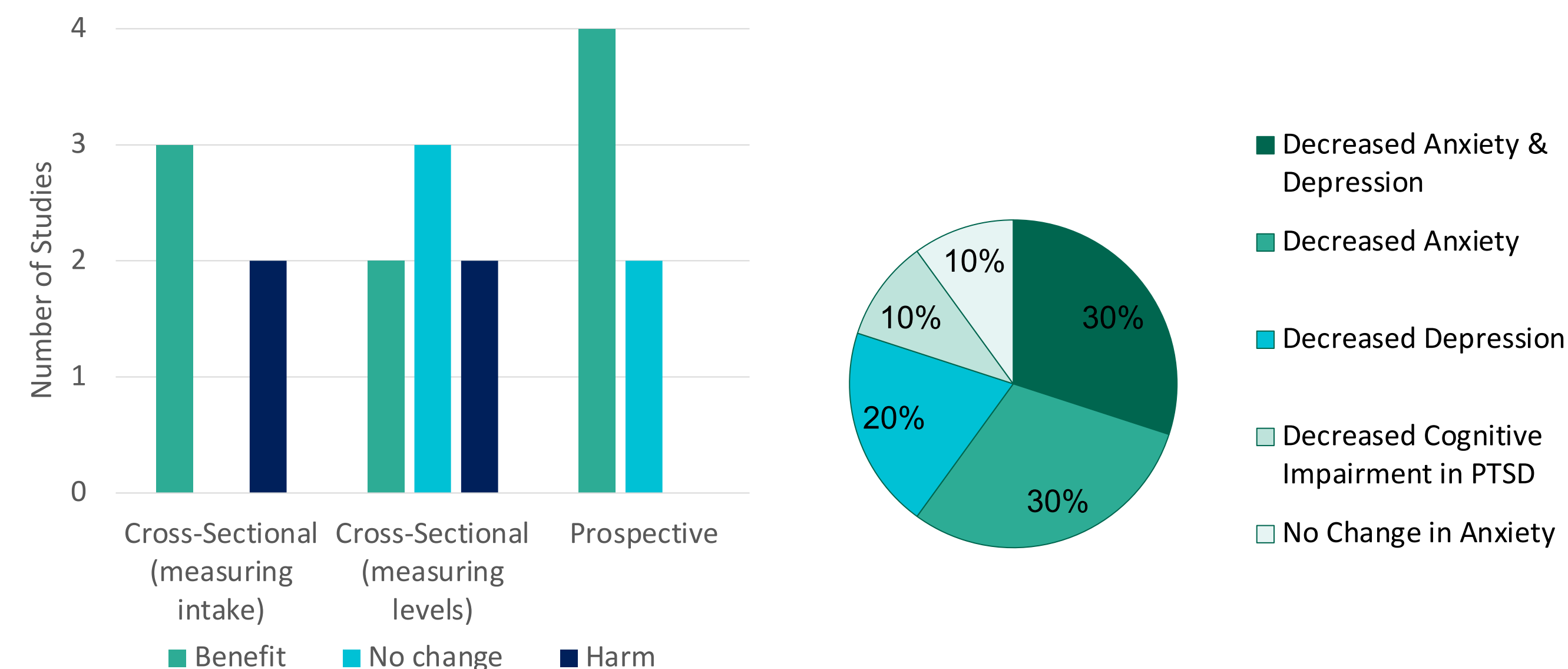


Figure 1. Observational Studies

Figure 2. Animal Studies

- Observational studies yielded inconsistent results. Some studies reported associations between more olive oil and higher (n=4) or lower (n=9) rates of mental illness, or no association (n=5).
- 9 of 10 animal studies reported significant improvements in mental health outcomes with higher olive oil consumption.

Discussions

Implications of Research

- Human experimental and animal trials reported a benefit of olive oil for mental health. However, observational studies show conflicting results.

Olive Oil as a Placebo

- Many studies used olive oil as a placebo to examine the effects of other interventions (such as fish oil) on mental health and reported benefits in the placebo group.
- Olive oil may be a poor choice of placebo in mental health research due to its potential therapeutic benefits

Possible Mechanism of Action

- Neurochemical studies suggest the anxiolytic effects may be due to the reduction of 5-hydroxytryptamine synthesis and metabolism in the brain. The anti-depressive effects may be due to the increase of dopamine release and turnover.

Limitations

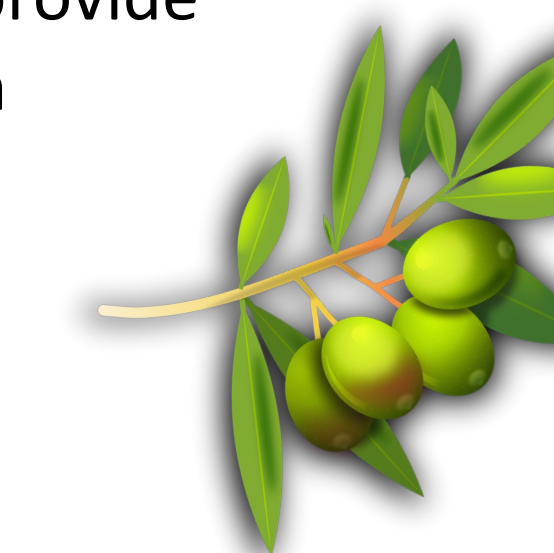
- Very few human experimental trials were identified.
- Studies used varying doses of olive oil for varying durations. Also, source and purity of olive oil is unknown.
- Only two databases used, some studies may have been missed.

Further Research

- There is a need for more randomized controlled trials to fully understand the potential of olive oil in a mental-health promoting diet.

Conclusions

The findings of this scoping review provide early support for a role of olive oil in dietary interventions aimed at improving mental health; however, more research, particularly in the form of high-quality clinical trials is needed.



The Effectiveness of Mistletoe Injections, Ketogenic Diets, and Yoga on the Quality of Life of Breast Cancer Patients Undergoing Conventional Treatment: A Narrative Review

Madison Peters, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- Breast cancer is estimated to affect 1 in 8 Canadian women during their lifetime.
- Early diagnosis and more effective treatments have led to more breast cancer survivors.
- Conventional treatment options for breast cancer include surgery, chemotherapy, radiation, hormonal treatment, immunotherapy, and gene therapy. These treatment options, though often effective and increase survival, can result in significant adverse effects and impairments in quality of life (QoL).
- Popular complementary treatments used during conventional treatments include mistletoe injections, ketogenic diets, and yoga.

Objectives

To analyze the effectiveness of mistletoe injections, ketogenic diets, and yoga on QoL of breast cancer patients undergoing chemotherapy and/or radiation.

Search Methods

- PubMed, Google Scholar, and Cochrane were used to search breast cancer AND QoL AND mistletoe injections OR ketogenic diets OR yoga.
- Selected articles were limited to randomized control trials (RCTs), systematic reviews, clinical trials, and meta-analyses. Only the RCTs not summarized in the meta-analyses were included.
- Studies that allowed participants to be on hormonal treatment were excluded.
- Mistletoe studies must have used subcutaneous injections only, no intravenous therapy.

Table 1. PICO framework

Population	Intervention and Control	Outcomes
Breast cancer patients undergoing conventional oncology treatment.	Control: chemotherapy and/or radiation only Intervention: control + mistletoe (VAE), control + ketogenic diet (KD), OR control + yoga	QoL, measured by the EORTC QLQ-C30*

- The literature search for mistletoe yielded 101 studies, of which 3 RCTs met the criteria. Ketogenic diets yielded 149 studies of which 3 RCTs met the criteria. Yoga yielded 669 studies of which 2 RCTs and 1 meta-analysis met the criteria.

*QoL measured by the EORTC-QLQ 30 comprises 15 subdomains, 6 assessments of functioning, and 9 symptoms related to QoL.

Results

Table 2. Mistletoe Injections vs. Conventional Care Only

Authors	Intervention	Comparison	Duration	Result
Pelzer et al., 2014	Helixor A (HxA) or Iscador M (IMS)VAEs subcut 3 times weekly & CAF	CAF chemotherapy, 6 cycles.	18 weeks.	Non statistically significant improvement in overall QoL. Role functioning, pain, and appetite loss subdomains had statistically significant improvement for the VAE group.
Tröger et al., 2009	IMS VAE subcut 3 times weekly & CAF	CAF chemotherapy, 6 cycles.	18 weeks.	Statistically significant improvements were seen in the VAE group for 12 of 15 subdomains of QoL including role function, social function, pain, and insomnia, global health, emotional health, constipation, diarrhea, and appetite loss.
Tröger et al., 2014	HxA VAE subcut 3 times weekly & CAF	CAF chemotherapy, 6 cycles.	18 weeks.	VAE group had a significantly better QoL in comparison to the CAF only group, including significant improvements in pain, role functioning, emotional function, social function, appetite loss, diarrhea, insomnia, and nausea and vomiting.

*CAF: cyclophosphamide, adriamycin, and 5-fluoro-uracil

Table 3. Ketogenic Diet vs. Conventional Care Only

Authors	Intervention	Comparison	Duration	Results
Khodabakhshi et al., 2020	KD consisting of 6% of calories from CHO, 19% protein, 20% medium-chain triglyceride (MCT) oil, and 55% fat & chemotherapy.	Standard diet consisting of 55% CHO, 15% protein, and 30% fat & chemotherapy.	12 weeks.	There were no significant differences seen in the QoL scores between the two groups, although there was a mean increase in QoL score compared to baseline in the KD diet, whereas the control group had a mean decrease.
Klement et al., 2021	KD consisting of 75-80% calories from fat, and limiting CHO to less than 50g per day & radiation.	No specific dietary advice, though could request dietary counselling (unrefined plant-based foods and limiting fat to 30-35% of daily caloric intake) & radiation.	16-31 radiation treatments.	KD during radiation improved overall QoL, though the difference was not statistically significant. Significant improvements were seen with subscales of emotional functioning, social functioning, and insomnia.
Augustus et al., 2020	Modified ketogenic diet (MKD) with medium chain triglycerides, consisting of 10% CHO, 15% protein, 75% fat & chemotherapy.	Patients were instructed to continue their normal diet, ensuring daily nutrient and energy requirements were met & chemotherapy.	16 weeks.	In comparison to the control group, the keto-adapted patients in the MKD group had a significant improvement in their QoL over time.

Table 4. Yoga vs. Conventional Care Only

Authors	Intervention	Comparison	Duration	Results
Jain et al., 2023	Practice yoga five days per week & chemotherapy and/or radiotherapy.	Chemotherapy and/or radiotherapy.	48 weeks.	There was a significant improvement in QoL in the yoga group in comparison to the control group. The control group experienced overall reductions in QoL from baseline to 48 weeks.
O'Neill et al., 2020	Yoga interventions included Hatha, Iyengar, Restorative, Vivekananda Yoga Anusandhana Samsthana (VYASA), Baba Joga and general/unspecified. Hatha yoga was the most common.	Chemotherapy and/or radiotherapy, "non-physical activity usual care".	The mean length across the 24 studies was 9.5 weeks, ranging from 6-26 weeks.	This meta-analysis concluded that yoga provides statistically significant small to medium improvements in QoL in comparison to controls.
Jong et al., 2018	Yoga program based on Dru Yoga once per week & Standard care (SC) chemotherapy only.	Standard care (SC) chemotherapy only.	12 weeks.	There were no other significant differences between the groups for global QoL. Significant improvement in subscales of QoL were seen in the yoga group at 6 months. These included nausea & vomiting and emotional functioning.

Discussions

Strengths

- Mistletoe trials followed strict dosing protocols and all patients followed the same CAF chemotherapy protocol.
- Both commercially available mistletoe products, Helixor and Iscador, were utilized and had similar efficacy for QoL.
- Two ketogenic trials provided continual check-ins or phone calls with the dietician to help increase compliance.
- All ketogenic trials utilized serum or urine measurement in an attempt to track compliance and ensure a state of ketosis.
- Yoga trials included a meta-analysis as well as a 48-week RCT.
- All three interventions have only minor safety concerns.

Limitations

- Ketogenic trials had shorter durations which may not have allowed enough time to see impact on QoL.
- The mistletoe trials were only on chemotherapy patients so the effectiveness in patients on radiation is unknown.
- All trial controls were chemotherapy and/or radiation so effectiveness in patients on hormone therapy is unknown.
- Duration of intervention for yoga trials varied from 6-48 weeks.
- Longer-term follow-up after intervention cessation would strengthen data.

Clinical Application

- Mistletoe, ketogenic diets, and yoga are viable treatment options for breast cancer patients undergoing conventional treatment to improve aspects of QoL.
- Based on the results of these articles, mistletoe injections and/or yoga would be the intervention of choice for improving QoL.
- According to the evidence, all interventions may be used in tandem alongside chemotherapy and/or radiation.
- Whether these interventions have an additive or synergistic effect or are independent options is complex and requires further research.

Conclusions

Mistletoe, ketogenic diets, and yoga are viable adjunctive treatment options for breast cancer patients undergoing conventional treatment to improve aspects of QoL. There is a trend towards improvement in QoL in all interventions, although this did not reach statistical significance in all studies appraised. Statistically significant improvement was seen with either global QoL or some subdomains of QoL in comparison to conventional care only.

The Critical Role of Diet in the Prevention and Treatment of Mental Disorders: An Opportunity for the Naturopathic Profession to Positively Impact the Burden of Illness using a Recently Developed Clinical Tool

Monique Aucoin, ND MSc ^(1,2), Dominique Barbaro, BSc, CCNM Student ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada; 2. University of Guelph, ON, Canada

Introduction

- Mental illness is the leading cause of disability in Canada, with 1 in every 3 Canadians being affected in their lifetime
- Many patients seek alternative/complementary care when conventional treatment options are not accessible, effective, or well tolerated
- Mental health concerns account for 11% of naturopathic patient visits, putting it in the most prevalent category of health conditions seen in naturopathic medicine
- Dietary counselling, as a tool for mental health promotion is underutilized within healthcare generally and the naturopathic profession

Objectives

1. Review evidence on the relationship between diet and mental health
2. Present a newly developed clinical tool which can be used to facilitate dietary counselling as a therapeutic approach to mental health care in clinical practice

Observational Evidence

- **Systematic review of prospective observational studies:** higher diet quality was associated with a lower risk of symptoms of depression at a later follow up time
- **Systematic review of observational studies looking at the relationship between the Mediterranean diet and Axis I disorders:** this diet pattern was associated with reduced symptoms of Axis I disorders, especially depression and anxiety
- **Recent systematic review and meta-analysis of observational studies:** increased consumption of processed foods was associated with increased odds of anxiety and depressive symptoms

Experimental Evidence

The 'SMILES' Trial

- Randomized controlled trial in Australia that measured the impact of dietary improvement for fifty-six adults with major depressive disorder
- The dietary support group had a significantly greater improvement on the MADRS than the social support group (p<0.001) with an NNT of 4.1

The HELFIMED Study

- Assessed the effect of a Mediterranean style diet intervention in combination with fish oil supplementation in a group of ninety-five adults with depression
- Results showed that the MedDiet group had a greater reduction in depression symptom severity and improvement in quality of life when compared to the social support group

Clinical Tool Design

Step 1: Scoping review of the relationship between diet and anxiety/psychotic disorders



Step 2: Design of a draft clinical tool and clinician guide



Step 3: Pilot testing - Individual interviews with people with lived experience with psychosis; focus group with psychiatrists



Step 4: Revision of the tool and guide

Eating well for mental health

A tool to support people impacted by mental illness

The food we eat affects our body and mind. You can make healthier choices that will improve your health.

Why is healthy eating important to me? _____

Read the recommendations below. Circle foods that appeal to you.



Choose complex carbs

- Whole grain bread, pita, tortilla, or pasta instead of white
- Instead of white rice, try brown rice, wild rice, quinoa, oats, millet
- Vegetables like potatoes, sweet potatoes, yams, corn, squash, cassava



Choose healthy fats like olive oil and sources of omega-3

- Eat fish and seafood (oysters, mussels, shrimp) at least 3 times per week
- Add nuts, seeds or avocado to meals, or enjoy as a snack
- Decrease deep fried foods (French fries, fried chicken)



Reduce highly processed foods and sugar

- Drink water instead of pop, juice and iced-tea
- Have cookies, cakes, muffins, ice cream, candy as a special treat, not every day



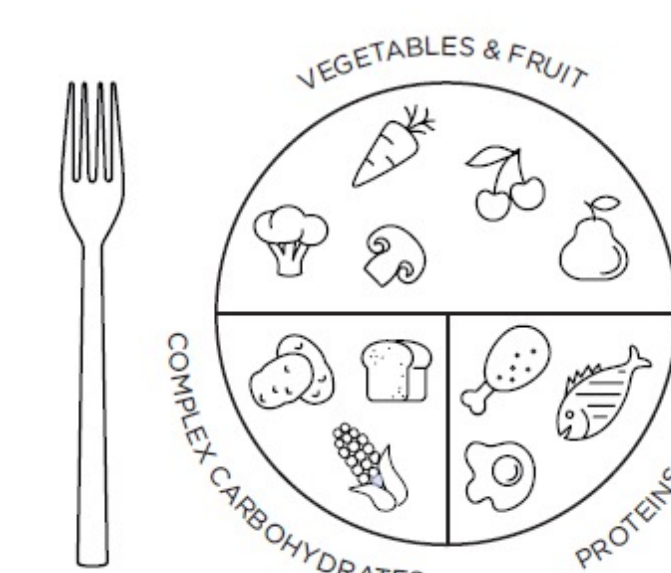
Add vegetables & fruits to meals and snacks

- Try to include different colours
- Add salad or veggies and dip to meals. Explore frozen and canned vegetables
- Try fruit that is fresh or frozen as a snack or dessert



Eat protein-rich foods throughout the day

- Try eggs, fish, seafood, chicken, turkey, beans, lentils, nuts, seeds, tofu, cheese, meats and wild game

Two Day Sample Meal Plan:

	Day 1	Day 2
Breakfast	Oatmeal/porridge with nuts or seeds and berries	Eggs with whole grain toast or potatoes and fruit
Lunch	Salad with protein-rich food and healthy fat	Turkey sandwich with side of sliced cucumbers and carrots
Dinner	Whole grain pasta with tomato sauce and added ground chicken and vegetables	Brown rice stir-fry with shrimp or tofu and frozen vegetables
Snack or Dessert	Vegetable sticks with hummus or guacamole	Plain yogurt with fruit

I'm going to try / I might like: _____

Healthy eating doesn't need to cost more:

Lower Cost Healthy Foods	Price (in Canadian dollars)
Frozen vegetables and fruit	\$3-4 per bag (5 or more servings)
Canned fish and seafood (tuna, oysters, salmon, mussels, sardines)	\$1.50-4 per can (1-2 servings)
Canned beans and lentils	\$1-2 per can (2 servings)
Eggs	\$3-4 per dozen (6 servings)
Whole grains in large packages	\$5-6 per bag (5 or more servings)
Tofu	\$3-4 per package (3 servings)

Tip: Shop at budget grocery stores, look for sales and stock up on non-perishable foods



My goals

Habit I would like to continue: _____
Changes I would like to make: _____
Who can help me achieve these goals? _____

Preparing food for yourself and making healthy food choices is self-care. Small changes add up. Eat and prepare meals with others.

Revised May 2023

Discussion

Barriers

- Health professionals' education and knowledge gaps – see the clinician guide
- Behaviour change - motivational interviewing, goal setting and action planning can help
- Cost of diet change – one study found a lower cost of Mediterranean diet vs baseline

Opportunity

- Naturopathic Doctors are well trained and positioned to take a leading role in the delivery of this care!

Call to Action and Conclusions

The burden of mental illness is high, and currently available treatments do not meet the needs of all people affected. There is emerging and compelling evidence that diet is an important modifiable risk factor. Early evidence suggests that diet modification is an effective therapeutic intervention that is currently underutilized in mental health care. Consider asking patients with mental disorders about their diet and supporting them in making changes

Introduction

- Generalized Anxiety Disorder (GAD) is a common psychiatric disorder
- Available conventional treatment options are not always accessible, effective, or well tolerated
- Research on nutritional interventions for anxiety disorders lags behind research related to depression
- Clinical evidence suggests that dietary modification and omega-3 supplementation can improve symptoms of depression; the EASe-GAD study is the first to test the effects of diet modification plus omega-3 on anxiety

Objectives

1. To gather and qualitative analyze data about the acceptability, participant experience, impact, strengths and weaknesses of the EASe-GAD intervention
2. To understand how the pilot program might be improved when delivered on a larger scale

Methods

- This study involved the conduct of focus groups to gather qualitative feedback about participant experience
- All EASe-GAD participants who consented to being contacted for further research were invited to participate via email
- Focus groups took place virtually on Zoom and were 60–90-minutes in length and involves four to five participants
- They involved a semi-structured interview approach with a set of pre-determined questions
- The sessions were recorded and transcribed for data analysis purposes. Transcription was done using the Zoom function and checked for accuracy by the study coordinator. Transcribed data were analyzed by thematic analysis using direct question and general thematic analysis approaches.

Quotes



"I was becoming more aware of like emotional eating patterns."

"I don't think that it really dawned on me that the change in the diet and everything that I was working on as I went through the program was actually helping me, that normally my stress levels at work would have been very elevated. I deal with like a lot of emergency responses. And I'm just finding that my reaction has changed drastically, like my own body reaction"

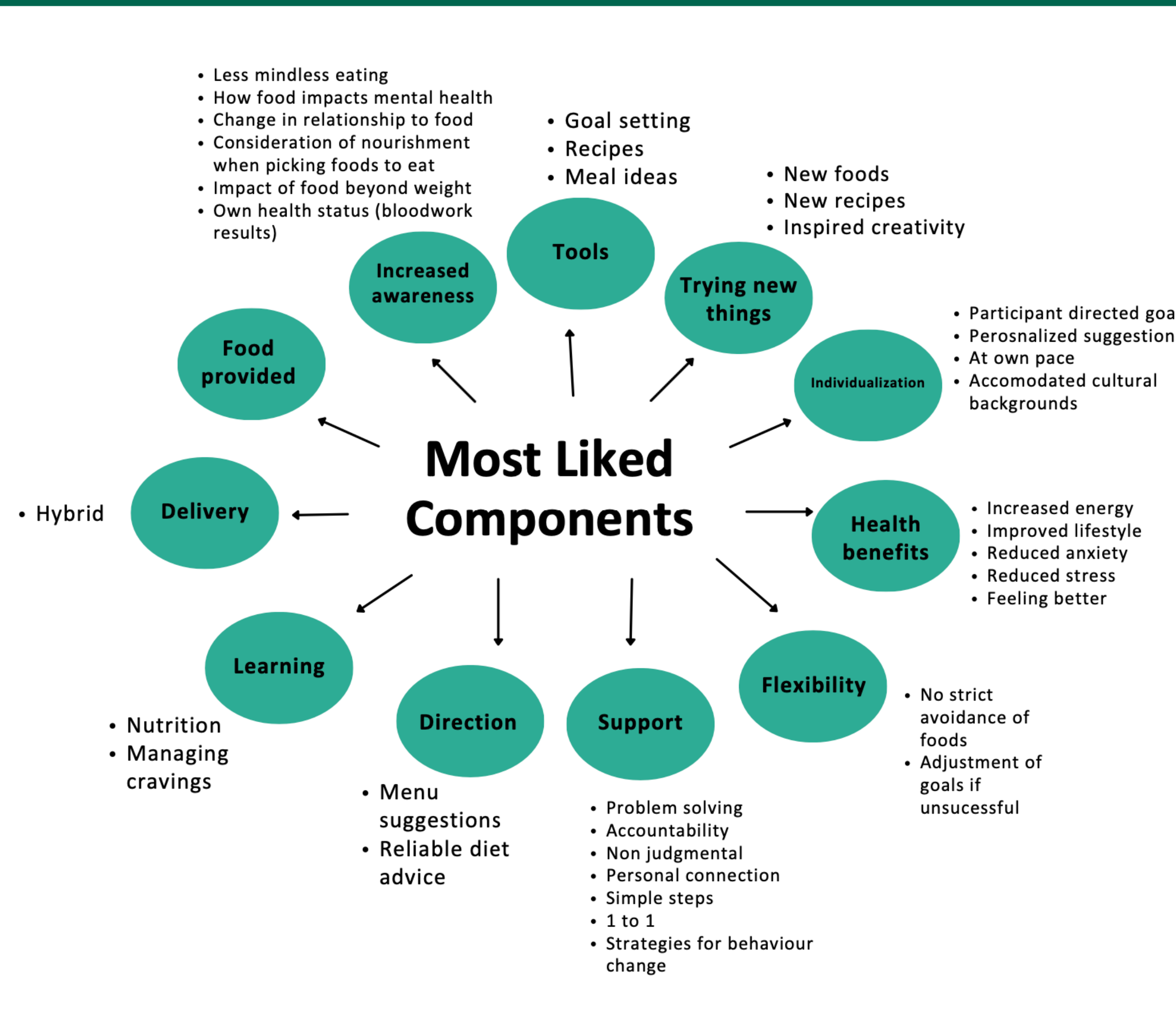
"For me, I think the cost is definitely less because I was in a very bad habit of eating out a lot, so being able to eat at home and make things and prepare food at home was, for sure way, more cost efficient than constantly eating out. And definitely, you know, healthier"

"[the program had] no sense of a judgmental tone. I might have forgotten to reach all aspects of the goal by the time of the next meeting and we just refocus and move on"

Regarding measurement of weight: "the lack of understanding causes some irritation. Why does my weight need to be taken if I'm constantly being reminded: This is not a diet plan and the weight doesn't matter."

"I just you know I found that as the weeks progressed my anxiety was dropping and dropping, and it was like, Oh, this is nice! I don't feel that, you know, Nervousness, that extra nervousness in my body. Which is great, and it's still continuing, I guess, because I'm still I'm still taking the supplements, which is good and trying to eat appropriately"

Themes



Results

- Three focus groups were completed with a total of 13 participants
- **Cost:** many participants reported that while some healthy foods are more expensive, the entire diet was not more expensive and that they were saving money by buying less takeout food
- **Measurement of Weight in the study:** several participants expressed confusion about this as they were told the goal was not to lose weight. One participant said that it created false hope and that it was unpleasant.

Suggestions for Improvement



Discussion and Conclusions

This project provided valuable insight into the participant experience and the impact of the pilot program. It identified opportunities for improvement of the program when delivered on a larger scale.

For references or further questions, please email: maucoin@ccnm.edu

Ancillary Analysis of the INCLD Health Study: Investigating the Relationship Between Dietary Practices, Microbiome, and Mental Health Outcomes in Complementary and Integrative Health (CIH) Students

Jensen Pletch, CCNM student ⁽¹⁾, Athena Tassone CCNM student ⁽¹⁾, Neda Ebrahimi, PhD ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

The International Cohort on Lifestyle Determinants of Health Study (INCLD) is a longitudinal cohort study composed of complementary and integrative health students (CIH) from the National University of Natural Medicine.

Measures include:

- Anthropometrics
- Serum and salivary biomarkers of cardiovascular risk, reproductive hormones, and cortisol
- Nutritional intake using digital food frequency questionnaires
- Microbiota sequencing
- Validated surveys to explore participants' mood, stress levels, and stress management practices

Objectives

- 1) Primary: To characterize the demographics of CIH students; including, health, lifestyle and wellness
- 2) Secondary: To evaluate associations between lifestyle and gut microbiota populations and diversity

Methods

Cleaning the Dataset

- Standardized inconsistent formats (i.e. dates, text)
- Checked for outliers and anomalies, addressing them appropriately

Coding the Dataset

- Created new variables to enhance analysis
- Implemented categorical variables for easier interpretation
- Ensured data integrity by validating coded variables against the original dataset

Summarizing the Dataset

- Summarized findings in summary tables for interpretation
- Generated descriptive statistics to provide an overview of the dataset

Results



Figure 1. INCLD health study participant attendance metrics

Demographics

- The population cohort consists of 190 individuals with 43 (24%) aged 21-25 years, 73 (41%) aged 26-30 years, 36 (20%) aged 31-35 years, and 25 (14%) aged 36 years or older at the baseline visit.
- The racial composition of the cohort includes 137 (77%) White/ Caucasian individuals, 13 (7%) Asian individuals, 11 (6%) individuals identifying as more than one race, 5 (3%) Black or African American individuals, 5 (3%) American Indian/ Middle Eastern individuals, and 6 (3%) individuals classified as other or unknown.
- The majority of participants classified their physical activity levels as active (46.3%), followed by low active (29.9%), very active (12.1%), sedentary (7.1%), and extremely active (3.6%).
- Within the population cohort, 163 (85.79%) of individuals reported taking one or more natural health product(s), and 111 (58.42%) of individuals reported intake of 1 or more prescription medication(s).

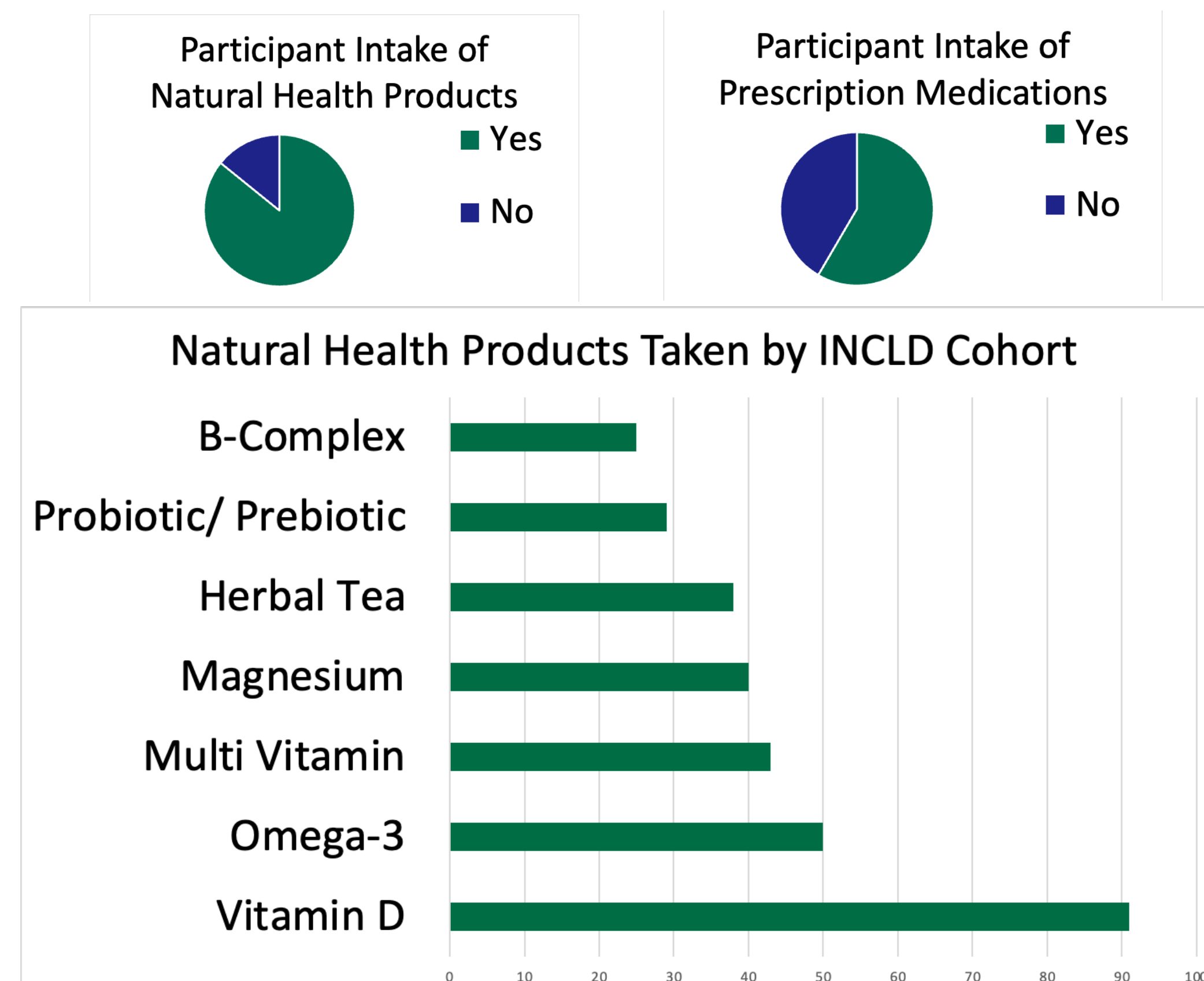


Figure 2. Natural health product data from the INCLD cohort

Discussions

Individuals enrolled in programs related to CIH may adopt unique lifestyle practices influenced by their educational curriculum. These behaviors, such as nutrition, herbal medicine, and mind-body practices are typically not found in the standard offerings of academic curriculum for conventional health programs. (Eisenburg; Hayes)

Next Steps & Future Applications

- 1) Completion of cohort description (analysis of sleep quality, PROMIS 29-depression, PROMIS 29-anxiety, multidimensional index of wellness, major depression inventory (MDI), and perceived stress scores)
- 2) Analyzing relationships between the following variables of interest for each category:

Dietary Data (Independent Variables)

- 1) Total dietary intake of high fiber food groups: a) vegetables, b) fruits, c) legumes, d) grains, e) nuts
- 2) Total daily fiber & fermented food intake
- 3) Usage of probiotics & fish oil supplements
- 4) Percentage of organic sourced foods

Microbial Data (Dependent Variables)

- 1) Alpha (Shannon Index)
- 2) Beta Diversity
- 3) Abundance of different phyla, specifically Firmicutes and bacteroidetes and their butyrate-producing members (i.e. Roseburia (firmicute phylum))

Mental Health Data (Dependent Variables)

- 1) PROMIS 29-depression scores
- 2) PROMIS 29-anxiety scores
- 3) MDI scores

Conclusions

This research highlights basic demographics and lifestyle practices of CIH students in the INCLD study. Further studies will evaluate the impact of these practices on mental and physical wellbeing and the gut microbiome.

Targeting Maternal Gut Microbiome to Improve Mental Health Outcomes – A Feasibility Study Protocol

Faith Gallant, OT Reg. (Ont.) ⁽¹⁾, Kieran Cooley, ND ^(2, 4), Sophie Grigoriadis, MD ⁽³⁾, Neda Ebrahimi, ND ⁽²⁾

1. NCCO Rehabilitation, ON, Canada; 2. Canadian College of Naturopathic Medicine, ON, Canada; 3. Sunnybrook Health Sciences, ON, Canada; 4. University of Toronto, ON, Canada



Introduction

- Perinatal depression and anxiety (PDA) is prevalent in new and expectant mothers.
- PDA impacts their ability to return to normal function.
- Current safety concerns with pharmacological treatment results in need to adjunctive treatment options.
- Gut Brain Axis (GBA) suggests communication between microbiome and the brain.
- Changes in microbiome thought to be related to PDA.
- Nutritional interventions may therefore play a role in neuropsychiatric outcomes during and after pregnancy.

Objectives

Assess the feasibility and acceptability of a combination of pharmacological intervention in currently stable pregnant women with a history of anxiety and/or depression.

Design & Participants

- Single centered, partially randomized controlled-double blind trial with three intervention arms.

Inclusion	Exclusion
<ul style="list-style-type: none"> • 18-43years old • 12-35 weeks of gestation • Uniparous pregnancy • Non-drug user • Financially stable • In a stable relationship • Clinical dx of PDA, depression, anxiety, but currently stable • No significant comorbidities • Ability to read English and provide consent 	<ul style="list-style-type: none"> • Pre-pregnancy BMI >30 • Low income • Single parent without support • Having a child with significant disability • Dx of other mental health disorder • Drug use • Prescription medication use • Restrictions or allergies to fish oils • Repeated antibiotic use • Unable to switch to study brand • Multiparous women with young children • No English

Secondary Outcome Measures

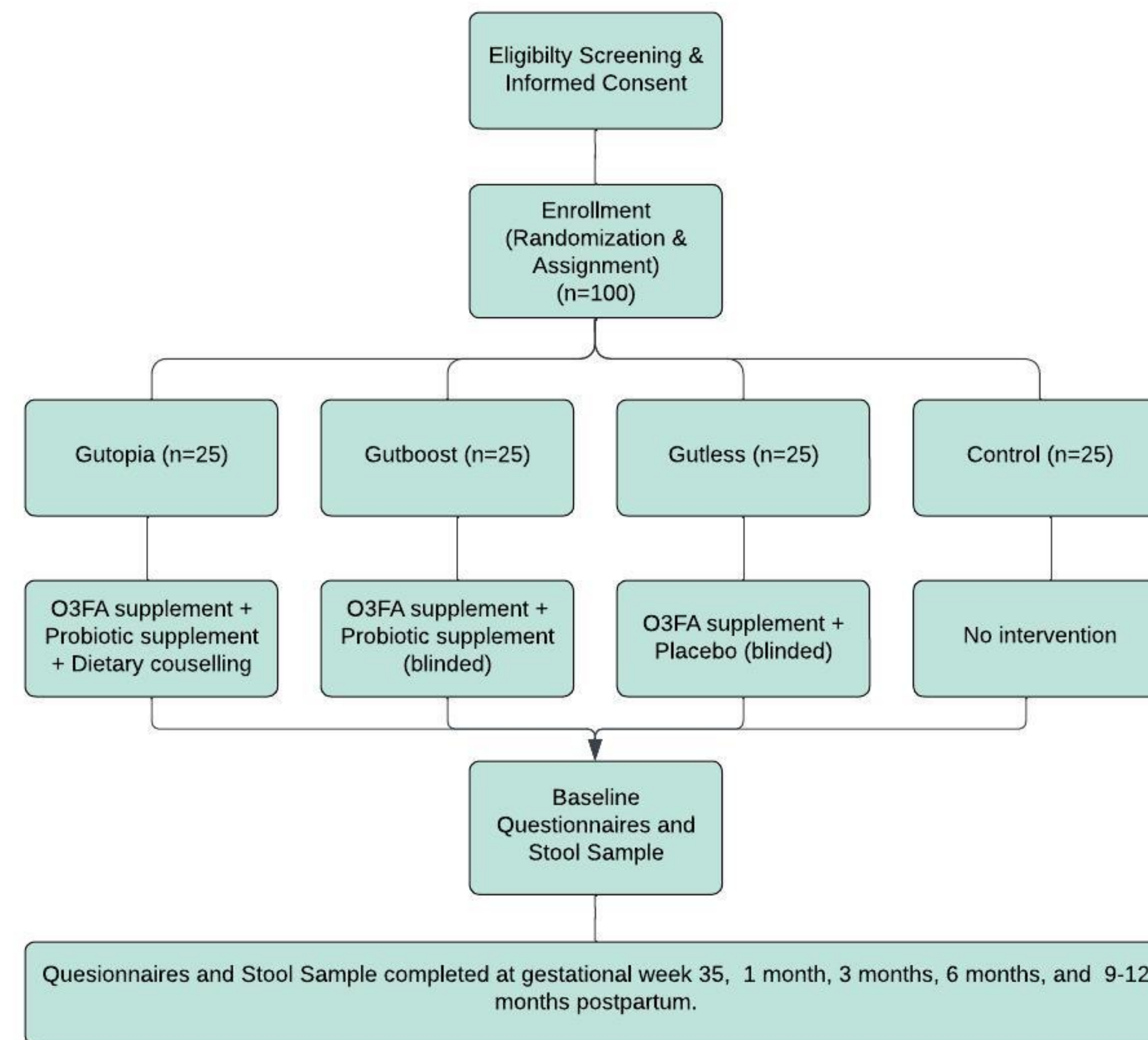
- EPDS and GAD-7 scores
- Microbiome profiling

Methods

Figure 1. Intervention Arms

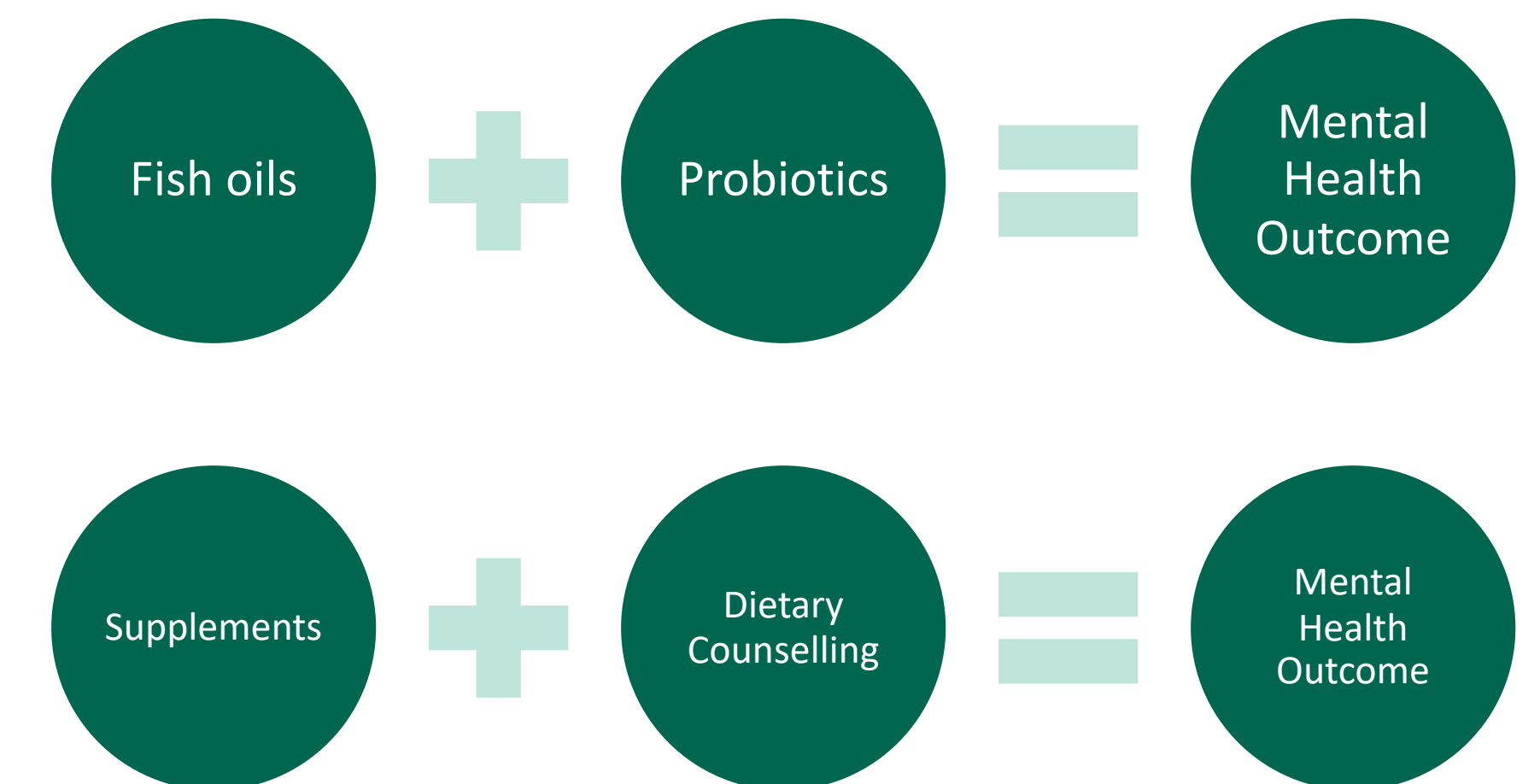
Gutopia	Gutboost	Gutless	Control
<ul style="list-style-type: none"> • Fish oil • Probiotic • Dietary counselling 	<ul style="list-style-type: none"> • Fish oil • Probiotic (blinded) 	<ul style="list-style-type: none"> • Fish oil • Placebo (blinded) 	<ul style="list-style-type: none"> • No intervention

Figure 2. Participant Flow Chart

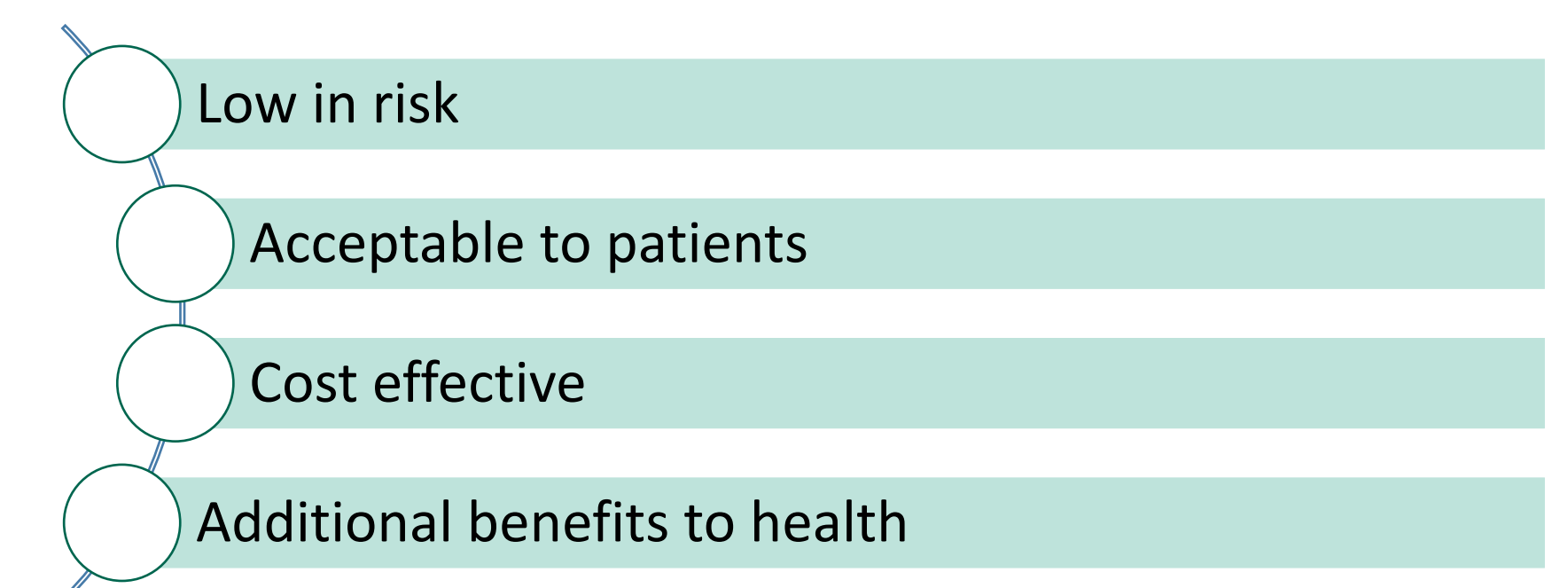


Anticipated Results & Discussion

- It is anticipated that pregnant women with a history of depression and anxiety will be particularly interested in partaking in this trial, resulting in favorable recruitment rates.
- While not our main objective, we anticipate a correlation between the microbial composition supplementation.
- This protocol will allow us to determine the following potential interactions:



- This study will build the foundation for larger powered studies to further contribute evidence for the efficacy of nutritional interventions, which are beneficial due to:



Conclusions

Nutritional supplements are a promising treatment option for women with PDA which should be further explored. It is anticipated that supplementation could have a positive mental health outcome.

The impact of interior built environment on student and employee experience and wellbeing: A review

Tiffany Turner, ND ⁽¹⁾, Madison Arnold, CCNM student⁽¹⁾, Loreal Legare, CCNM Student ⁽²⁾

1. Canadian College of Naturopathic Medicine Boucher Campus, New Westminster BC, Canada

2. Canadian College of Naturopathic Medicine Toronto Campus, Toronto ON, Canada

Introduction

In considering the whole patient, naturopathic physicians pay attention to the patient's context, including their physical, natural, and social environments. The relationship between the built environment and human health is complex, but has implications for physical, cognitive, emotional, and social wellbeing.

Objectives

This review examines the impact of non-structural interior elements on mental health and wellbeing, stress management, cognitive function, and academic and work performance with a focus on the relevance of these findings for student and employee wellness within educational institutions.

Search Methods

A search was performed in PubMed, CINAHL, Web of Science Core Collection, APA PsycInfo, and APA PsycARTICLES databases to identify review articles mentioning the impact of interior/indoor built environments on mental wellness, mental health, stress management, academic and work performance, or cognition. All studies were screened and extracted in duplicate using Covidence.

Results

A total of 6,495 studies were screened and 80 studies met the inclusion criteria. Non-structural interior elements such as colour, lighting, shape, temperature, spatial arrangement, furniture, sound, air quality, art, and plants and other nature-based elements were found to have associations with various aspects of mental health and wellbeing, cognition, stress, and academic and work performance. The studies included within the reviews demonstrated a wide range in study quality, context, and methodological design.

Results

Table 1. Impact of Interior Environment on Mental Health and Wellbeing, Stress, Cognition, and Performance

	Mental Health and Wellbeing	Stress Management	Cognition	Academic Performance	Work Performance
Colour	Colour impacts mood and mental wellbeing, with mixed results. Cold and dark colours have been associated with anxiety and depression, respectively, although red and yellow have also been associated with anxiety. Lack of colour in institutional settings detrimental to wellbeing. Plant colours also impact emotions. Culture, context, and gender should be considered.	Atypical, dark, or inappropriate colours in an environment can trigger mental stress. Blue and green have been associated with stress relief.	Cold colours associated with increases in attention and memory. High contrast has also been associated with increased spatial memory.	Cold colours improved students' performance, memory, and attention and subdued colours preferred for study spaces. Impacts of specific colours vary with outcomes of interest and with context.	Subdued colours are preferred for work environments but it has been suggested that red may lead to higher work efficiency, though not universally found to be pleasant. No effect of red vs. blue meeting room on productivity.
Shape	Curvilinear forms and higher object affordance (smooth, rounded shapes) associated with positive psychological responses and wellbeing, whereas angular forms may activate fear response in amygdala. Effects depend on context.	Fractals associated with reduced stress and improved stress recovery.	Curvilinear spaces in conjunction with high ceilings may improve attention.	Not mentioned.	Not mentioned.
Lighting	Illuminance and correlated colour temperature (CCT) impact mood (effect may differ by gender). Higher CCT better for mental health, lower CCT better for social functioning, and no effect found on negative mood. No impact of light source on mental health. Unknown effect of luminance and uniformity on mental health. Artificial skylight vs. fluorescent lights impacts mood. Proportion of direct vs. indirect light did not affect wellbeing. Lighting effect on affect may be task-dependent.	Stress reduced with standard lighting and inadequate lighting contributes to stress. Artificial skylight vs. fluorescent lights improved stress. Uniform light may decrease job stress.	Mixed results on impact of illuminance and colour temperature on cognition, potentially interacting with mood. Highest scores for memory at 300 lux, perception at 2200 lux. Conflicting results for impact of CCT on memory. Poor lighting conditions can substantially reduce cognitive performance. Performance (self-assessed) best with dim light in noisy context, high illuminance in quiet context. White light impacts reasoning and creativity. Higher CCT best for concentration.	Blue-enriched LED suggested to improve wakefulness for morning classes but warm white light suggested to facilitate communication. Level of light influences engagement. LED vs. fluorescent lights improved engagement. Poor light and visual glare detrimental to learning. Illuminance higher than recommended detrimental to visual comfort. Variable light may enhance performance and social function.	Blue spectrum light helpful for tasks requiring long periods of attention. Task appropriate lighting and control over lighting increases productivity.
Temperature	Temperature reported as an important need for wellbeing and emotional affect. Neutral temperature (26°C) resulted in more positive emotion than higher or lower temperatures. Temperature can influence feelings of belonging and loneliness and trigger memories associated with specific temperatures.	Comfortable indoor temperature reduces stress, thermal discomfort or variability increases stress. Stress levels were highest when indoor temperature was 30°C.	Thermal discomfort negatively impacts cognition. Optimal may vary depending on task (e.g., perception—warm; memory—neutral; problem-solving—cool). Overall, cognition may be fairly stable across wide range. Temperature variation may be detrimental to cognition and concentration.	Lower temperature associated with higher attention levels and may improve academic performance. Elementary students less impacted by temperature changes than high school students and adults. Worse test performance with thermal discomfort.	Only small amount of work performance variation explained by temperature. Changes in performance due to thermal stress not affected differently by age, but females may be more resistant to performance decline. Work efficiency increases when workers can control the temperature.
Spatial Arrangement	Arrangements that facilitate social interaction associated with better mental health. High social or spatial density is detrimental. Curvilinear spaces associated with positive emotion. Prolonged thigmotaxis associated with anxiety.	Visual and locomotive permeability impact stress responses and perception of safety. Stress reduced in labyrinths, open offices, and spaces that encourage movement. Closed room impedes stress recovery. Mazes and overcrowding are stressors.	High social or spatial density negatively impacts cognition. Wide classrooms associated with lower attention and memory; narrow classrooms associated with better memory. Poor spatial design associated with cognitive fatigue.	Performance enhanced with small spaces and flexible learning spaces. Flexible learning spaces associated with collaboration, engagement, and autonomy.	Poor spatial design, size, and flexibility decrease productivity. Mixed results on open-plan offices, e.g., social cohesion vs. distraction, privacy issues. Zoned open-plan designs better for productivity. Cell and flex offices—less stress and distraction.
Furniture	Mood appears to be uninfluenced by sit-stand desks (most studies reported insignificant results), though one study found an increase in happiness. Open bench seating is associated with positive emotion in those with extraversion.	Sit-stand desks may improve stress levels and stress resilience.	Altogether, sit-stand, treadmill, and cycling desks did not significantly impact attention, reasoning, or reaction time. Treadmill desks positively impacted recall. Open bench seating may improve focus for those scoring high in extraversion, and decrease focus for those scoring high in neuroticism.	Overall, no benefit of dynamic seating on academic performance, although some studies report improved engagement (focus on students with ASD) and in elementary school students, but not high school students, an increase in attention was found.	Treadmill and cycling desks negatively impact typing speed and accuracy. Most studies on productivity impact of sit-stand desks demonstrate null outcomes and unclear risk of bias. Personal desks rather than activity-based format result in better perception of workplace support for productivity. Furniture identified as a top ten factor for productivity.
Plants	Indoor plants associated with reducing anxiety and depressive symptoms and improving perception of wellbeing, general emotional state, and positive affect, although some studies have not found a significant impact on wellbeing. Colour and type of plant may be influential to the impact.	Indoor plants and caring for plants associated with decreases in stress levels and better physiological stress recovery. Plants made office workers feel like they were under less pressure. May be associated with reduced stress in workers whose jobs require high levels of concentration and quick responses.	Indoor plants were associated with higher performance on various cognitive tests and better concentration and memory. Concentration, in particular, was frequently mentioned in relation to plants.	Presence of plants associated with increased academic performance, including math and English scores. Taking care of indoor plants also resulted in higher academic achievement and productivity.	Indoor plants may reduce psychological job strain and absenteeism and improve productivity outcomes. Number of plants may positively correlate with productivity at work, but reports are conflicting, possibly due to specific plants used. No effect on job satisfaction, which may have already been high.
Nature	Mental health improved with exposure to biophilic design elements, including images, videos, sounds, smells, patterns, and materials (e.g., wood). Associated with decreased anxiety and loneliness, restoration, emotional recovery, and increased mood. Lack of nature detrimental to wellbeing.	Indoor nature elements and representations of nature are associated with stress reduction, including job stress. Wood elements and visible greenery reduce stress, and plant photos were associated with better stress relief than non-plant photos.	Nature elements associated with improved memory, attention, creativity, concentration, and information management and processing. Mixed reports for impact on executive function.	Biophilic design associated with benefits to learning in children.	Biophilic design associated with increased productivity. Nature elements may also impact motivation, increase job satisfaction or satisfaction with the workplace, and reduce sick days.
Sound and Noise	Increased sound/noise levels impact mental wellbeing by increasing stress. Noise annoyance associated with depression and anxiety. Natural soundscapes and music associated with improved mental health. Reduced reverberation to levels between 0.5–0.9 seconds improves students' wellbeing.	Quiet music and natural soundscapes (e.g., birds, water, etc.) associated with reduced stress and improved stress recovery. Noise leads to stress when it interferes with daily activities, is >50 decibels, or is unpredictable, uncontrollable, or inescapable. Enhanced sound absorption reduces stress.	Noise has a negative impact on cognition but cognitive fatigue may decrease and concentration increase with nature sounds. Noise negatively impacts concentration, reasoning, and memory, and, when chronic, is associated with reading deficits. Improvements with enhanced sound absorption.	Noise can negatively impact learning and reduce time spent on tasks. Reduced reverberation to levels between 0.5–0.9 seconds improves students' academic performance, satisfaction, and concentration. Environments with decibels <50 showed better attention scores in students.	Conflicting results for impact on productivity and concentration in employees. When surveyed, most believe it has a negative impact on their work. Studies showing negative effect suggest that offices be kept between 35–50 decibels. Open plans distract and negatively impact productivity.
Air Quality	Proper ventilation has benefits for overall mental health and wellbeing. Insufficient ventilation, airborne pollutants, organic solvents, VOCs, odour irritants, and toxins create discomfort and lead to long-term negative effects on mental wellbeing, including negative correlations with depression and anxiety.	Higher levels of stress were found when individuals were exposed to air pollutants and odour irritants, and lowered stress levels were observed with natural fragrances.	Cognition is strongly associated with proper ventilation in buildings. Multiple studies report negative impacts on cognition (decision making, problem solving, cognitive fatigue, and memory) with CO ₂ levels above 1000ppm. Cognitive function is improved with lower CO ₂ levels. Statistically significant associations have been found more frequently between air quality and higher order cognitive skills than for memory. Air pollutants and VOCs have also been associated with negative impacts on cognition.	Poor air quality and ventilation in schools contributes to lower productivity, lower academic achievement (decreased memory, decision making, reaction time, attention, and concentration), and increases absenteeism. Improving air flow and ventilation increases student performance, comfort, and productivity.	Improving the quality of air improves employee productivity and poor air quality negatively impacts productivity.
Art and Wall Elements	Artwork, including both abstract/figurative art and images of nature, has a positive effect on overall wellbeing and mood, with reductions in depression and anxiety. In the workplace, allowing employees (specifically women) to personalize and decorate created enhanced wellbeing.	Artwork of nature and natural settings shown to be most effective in lowering stress and anxiety, compared to abstract art. One study also demonstrated images of nature increased positive feelings after a stressful exam. Nature murals including water were seen as most restorative.	Not mentioned.	Artwork of natural settings improved attention in students. In addition, children were found to learn less, complete tasks more slowly, and be more distracted when in a decorated vs. plain classroom.	Personalisation may impact meaningfulness, and as a result, job satisfaction. This may be a particular risk of activity-based working.

Discussion

The wide variation in studies makes it challenging to assess overall impact. The focus on singular aspects of the environment leaves room for future studies addressing the impact of these interior elements in combination. Going forward, interdisciplinary collaboration between healthcare and design professionals has the potential to result in indoor environments that promote wellbeing and improve performance.

Conclusions

This project increases our understanding of the impact of the interior built environment on wellbeing and performance and provides a starting point for guiding interior design choices in academic and professional work environments.

For references or further questions, please email: tturner@ccnm.edu

Naturopathic approaches to atopic dermatitis: a cross sectional audit of patient care at a naturopathic teaching clinic

Brennan Dedecker, ND ⁽¹⁾, Kieran Cooley, ND (non-clinical) ⁽¹⁻⁴⁾

1. Canadian College of Naturopathic Medicine, ON, Canada; 2. University of Technology, Sydney; 3. Southern Cross University; 4. University Of Toronto

Introduction

- It is estimated that up to 17% of Canadians will suffer from atopic dermatitis (AD) at some point in their lives.¹
- In Ontario specifically, patients with AD have an average of 3.6 publicly funded doctor visits per year to assess and treat their AD.²
- The total cost of AD in Canada is estimated to be 1.4 billion Canadian dollars annually.²
- Given this burden, there is a growing interest in the use of complimentary and alternative medicines (CAM) as an adjunct to conventional treatment for AD.³
- In fact, up to 34% of patients will seek out and use CAM therapies at some point to treat their AD, however, less is known about the nature of the care that is being provided by CAM professionals, including naturopathic doctors.³

Objectives

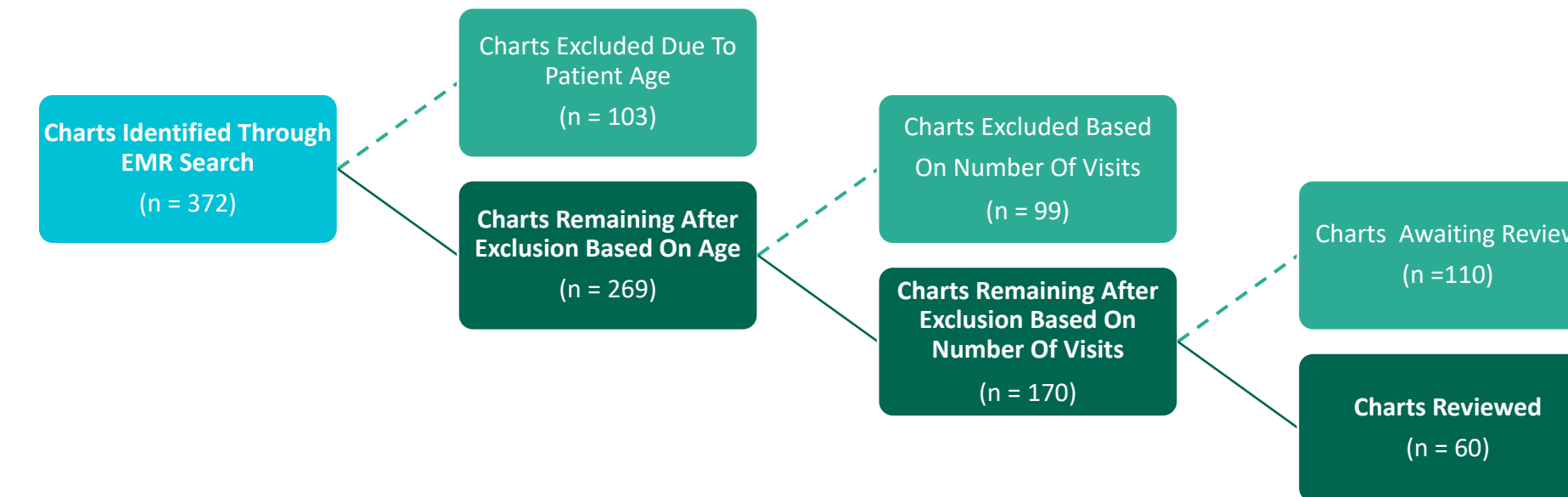
This study aims to describe the different therapies used by naturopathic doctors to support patients with AD. This research may provide useful information in the development of standards of care and practice guidelines for the holistic treatment of AD.

Search Methods

- Electronic medical charts from the Robert Schad Naturopathic Clinic (RSNC) were reviewed for demographics, treatments, compliance, and response to treatment.
- Charts were selected by searching the electronic medical record system of the RSNC between May 1st, 2019 and Dec 31st, 2022 for patients with atopic dermatitis in their charted assessment (ICD9 Code 691 and 691.8).
- Records were excluded if they did not have at least 3 visits during the date range specified, or were under 18 years of age at the time of their first appointment.
- Manual extraction was done by one individual using a pilot-tested template to describe the nature of the conditions, laboratory investigations and treatments provided.
- This study was approved by the Canadian College of Medicine's Research and Ethics Board.

Participants

Figure 1. Participants



Results

Demographics

- Age:** Ages ranged from 23 to 71; with the average age being 38 (SD 13.99).
- Gender:** Female (n = 45); Male (n = 6); Not Charted (n = 9).

Average Number Of Visits

- Number of visits ranged from 3 to 46; with the average number of visits being 13 (SD 13.54).

Clinical Severity Assessments (SCORAD, EASI, POEM)

- 0 of 60 charts (0%) included a standardized clinical severity assessment to assess and track the extent of disease.

Conventional Treatments

- See 'Figure 2. Conventional Treatments'.

Lab Assessments

- Lab assessments were available in 30 of 60 charts.
- See 'Figure 3. Lab Assessments'.
- Relevant Findings:** Vitamin D deficiency (n = 9); low ferritin (n = 9); elevated eosinophils (n = 6).

GAD-7 or PHQ-9

- A completed GAD-7 was available in 5 of 60 charts (8%).
- A completed PHQ-9 was available in 3 of 60 charts (5%).

Photo Tracking

- Photos were used to track lesion progress in 12 of 60 charts (20%).

Naturopathic Treatments

- See 'Figure 4. Naturopathic Therapies By Modality'.
- See 'Figure 5. Nutraceuticals and NHPs'.

Figure 4. Naturopathic Therapies By Modality

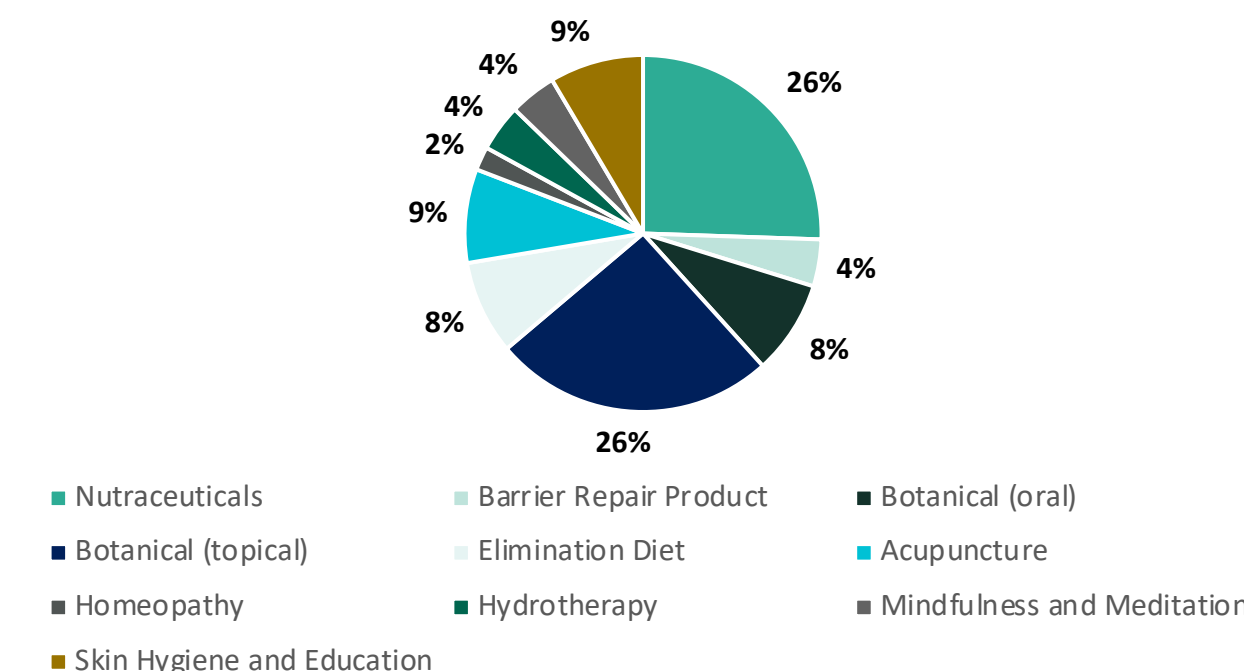


Figure 2. Conventional Treatment

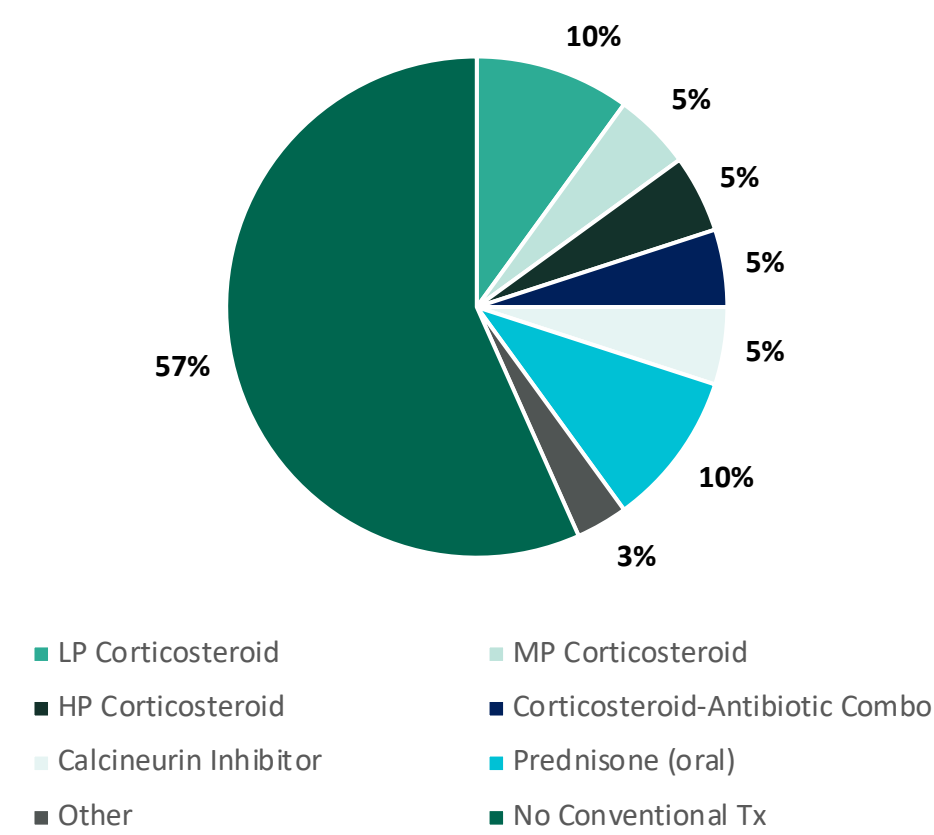


Figure 3. Lab Assessments

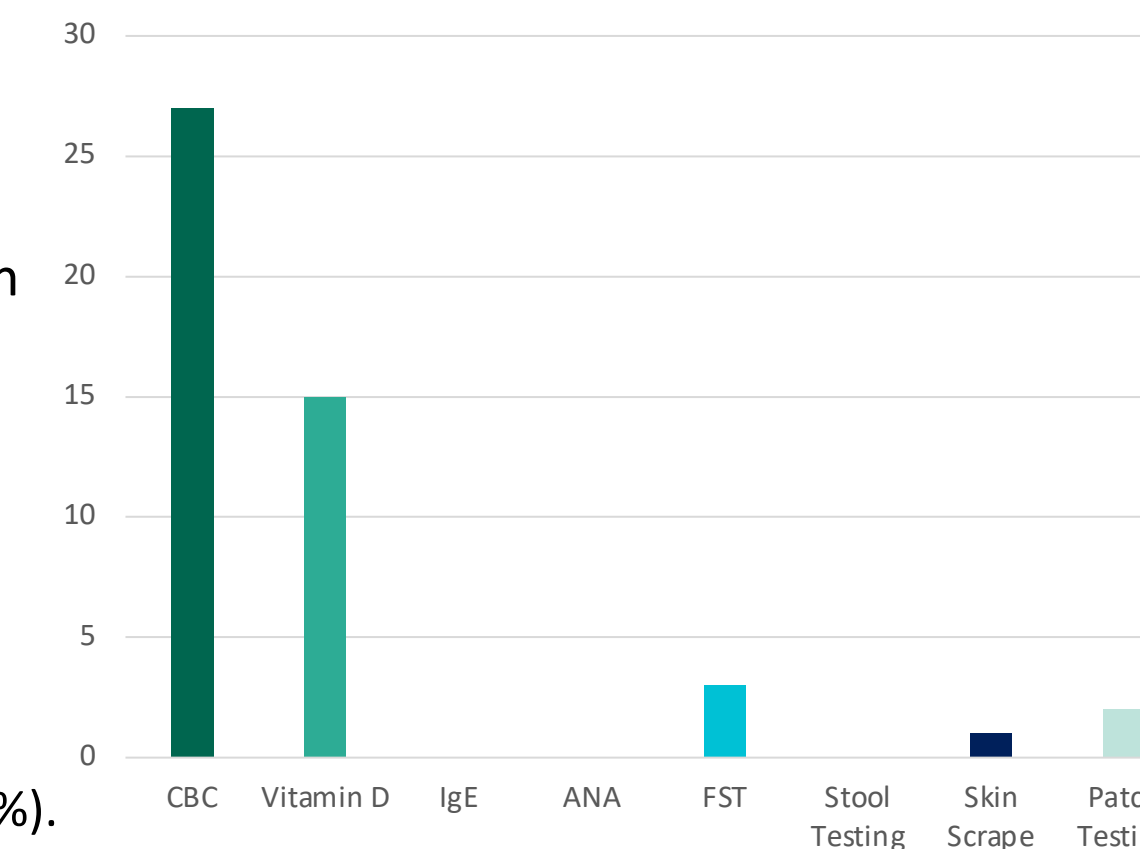
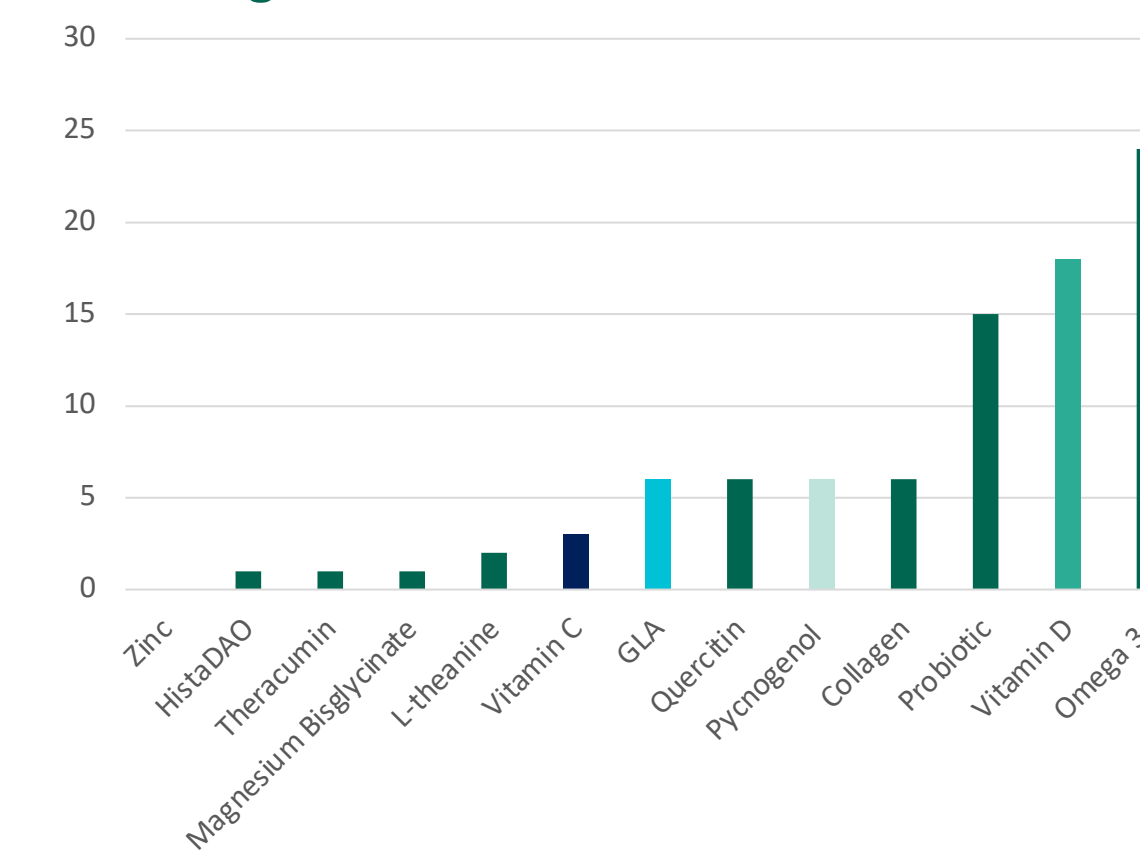


Figure 5. Nutraceuticals and NHPs



Results Cont'd

Nutraceuticals and NHPs

- Omega 3s:** Daily doses ranged from 250mg of EPA and 300mg of DHA to 3380mg of EPA and 866mg DHA; with the average daily dose of EPA being 1738mg; and the average daily dose of DHA being 684mg.
- Vitamin D:** daily doses ranged from 800IU to 5000IU; with the average daily dose being 2133IU.
- Probiotics:** all options recommended were multi-strain products; daily doses ranged from 7 billion CFUs to 15 billion CFUs.

Botanicals (Oral)

- Ashwagandha (*Withania somnifera*) was recommended in 6 of 60 charts (10%); with an average daily dose of 600mg.

Botanicals (Topical)

- St. Francis' Skin Healing Salve was recommended in 18 of 60 charts (30%).
Medicinal Ingredients: Extra Virgin Olive Oil (*Olea europaea*, fruit), Red Clover (*Trifolium pratense*, blossoms), Calendula (*Calendula officinalis*, flowers)
- An oatmeal bath or paste was recommended in 9 of 60 charts (15%).

Nutrition

- A diet diary was completed in 12 of 60 charts (20%).
- The elimination diet was the most popular dietary intervention recommended (12 of 60 charts (30%)).
- General nutrition themes:** increase water intake; increase consumption of healthy fats; increase fruit and veg consumption; increase fiber intake.

TCM and Acupuncture

- A TCM diagnosis was only made in 1 of 60 charts (2%).
- Acupuncture was used in 12 of 60 charts (20%).
- Popular Acupuncture Points:** LI 11, HT 3, PC 6, and UB 40.

Education

- Skin hygiene and bathing education was provided in 7 of 60 charts (12%).
- Education on hypoallergenic/fragrance-free detergents and personal care products was provided in 5 of 60 charts (8%).

Discussions and Conclusions

As data extraction is still on-going, discussions and conclusions are still pending. This cross-sectional audit will reveal common patterns in assessment, management, and treatment of AD, and may provide a foundation for establishing best practices, guidance or education for treating patients presenting with these concerns that is inclusive of the care being provided by naturopathic doctors.

For references or further questions, please email: bdedecker@ccnm.edu

Evaluating the Impact of Tai Chi on Hypertension: A Narrative Review

Shivangi Maheshwari, BSc, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada



Introduction

- Hypertension (HTN) has been shown to increase the risk of cardiovascular mortality.
- Risk factors include family history, obesity, aging, chronic conditions, stress, and non-adherence to medication.
- HTN may also be impacted by lifestyle and diet choices like the use of alcohol, tobacco, and/or high sodium/low potassium diets.
- These risk factors impair endothelial function in the body.
- Many pharmaceutical options exist to reduce HTN, but they are not without potential adverse effects.
- Tai Chi, is a form of meditative movement therapy which has been researched to help in reducing stress.
- As it promotes slow and simple movements it can be performed by individuals in all age groups and body types.

Objectives

To analyze whether or not Tai Chi has an impact on hypertension.

Search Methods

- PubMed was used to search Tai Chi AND hypertension or Tai Chi AND high blood pressure.
- PICO criteria were established prior to the search as in Table 1.
- Articles were limited to meta-analyses and randomized-control trials (RCT) and excluded any RCTs that were included in the meta-analyses.
- The literature search for hypertension and Tai Chi yielded 27 results out of which 10 met the inclusion criteria of which three are summarized in this analysis

Table 1: PICO framework

Population	Intervention	Outcomes
<ul style="list-style-type: none"> Adults with Hypertension 	<ul style="list-style-type: none"> Tai Chi vs. control group (those who did not engage in any Tai Chi) 	<ul style="list-style-type: none"> Systolic and/or diastolic blood pressure

Results

Table 2. Impact of Tai Chi Exercise on High Blood Pressure

Author	Intervention	Study Type	Results
Steadman Breit JP, Kelley GA. (2022)	24-movements and Yang-style Tai Chi interventions (shorter duration and then 12-week)	Meta-analysis	Both 24-movement and Yang-style Tai Chi interventions demonstrated significant reductions in systolic blood pressure (SBP) compared to control groups. Similarly, Tai Chi interventions exceeding 12 weeks showed significant reductions in SBP. Overall, Tai Chi interventions were found to significantly reduce diastolic blood pressure (DBP) compared to control groups, with a standardized mean difference (SMD) of -0.57 (95% CI -0.77, -0.37). The effectiveness of these reductions in blood pressure was more consistent with longer durations of Tai Chi practice.
Thornton EW. (2004)	12-week Tai Chi exercise program	(RCT)	A 12-week Tai Chi exercise program for middle-aged women initially enrolled 40 participants, with three dropouts from each group. The Tai Chi group demonstrated high adherence, attending an average of 34 out of 36 sessions. Significant reductions in systolic and diastolic blood pressure were noted in the Tai Chi group, with average decreases of 9.7 mmHg and 7.5 mmHg respectively, whereas no significant changes were observed in the control group. This study highlighted that Tai Chi's cardiovascular benefits may extend beyond elderly populations, suggesting potentially underestimated advantages, particularly in younger age groups.
Chan AWK, Chair SY Lee DTF et al. (2018)	24-form Yang-style Tai Chi exercise for 60 minutes twice a week for 3 months. Then self-practice at home for 30 minutes daily, at least 5 days a week.	(RCT)	The study compared the effects of Tai Chi and brisk walking on various health parameters in individuals with cardiovascular risk factors. While both interventions led to improvements in several measures, including blood sugar levels and perceived stress, Tai Chi was notably more effective in reducing blood pressure compared to brisk walking. Specifically, Tai Chi resulted in significant reductions in both systolic and diastolic blood pressure at 3 and 9 months, highlighting its superior efficacy in managing hypertension and cardiovascular risk factors.

Discussions

Studies

- Research conducted on individuals with hypertension suggests that performing Tai Chi regularly decreases systolic and diastolic levels.
- One study found that continuing the exercise regime for a longer period of time was associated with a greater decrease in blood pressure.
- Tai chi affects endothelial function by altering levels of nitric oxide (NO) and endothelin-1 (ET-1) in the blood, resulting in vasodilation.
- There have been no adverse effects associated with Tai chi practices.

Limitations

- Some of the studies focused on more specific populations, reducing generalizability. More diverse patient populations should be encouraged in future studies.
- Most studies were limited to 12 weeks of intervention. Future studies should look at longer duration of intervention delivery and longer term follow up The impact of Tai Chi in most studies is researched in a short term, such as 12 weeks. However, this does not capture the long-term effects or sustainability of improvements.

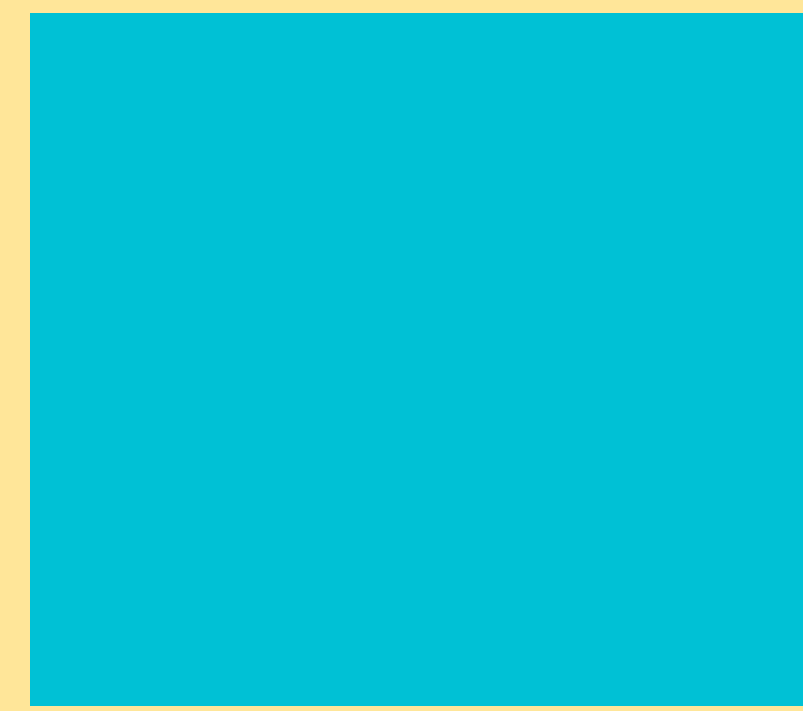
Conclusions

The research findings suggest Tai Chi can be effective in reducing both systolic and diastolic blood pressure, particularly in middle-aged women and individuals with cardiovascular risk factors.

Further research involving diverse populations and comparative studies with different exercise modalities are warranted.

For references or further questions, please email: smaheshwari@ndnet.ccnm.edu

Primary brand colours



Hex: #00C1D5

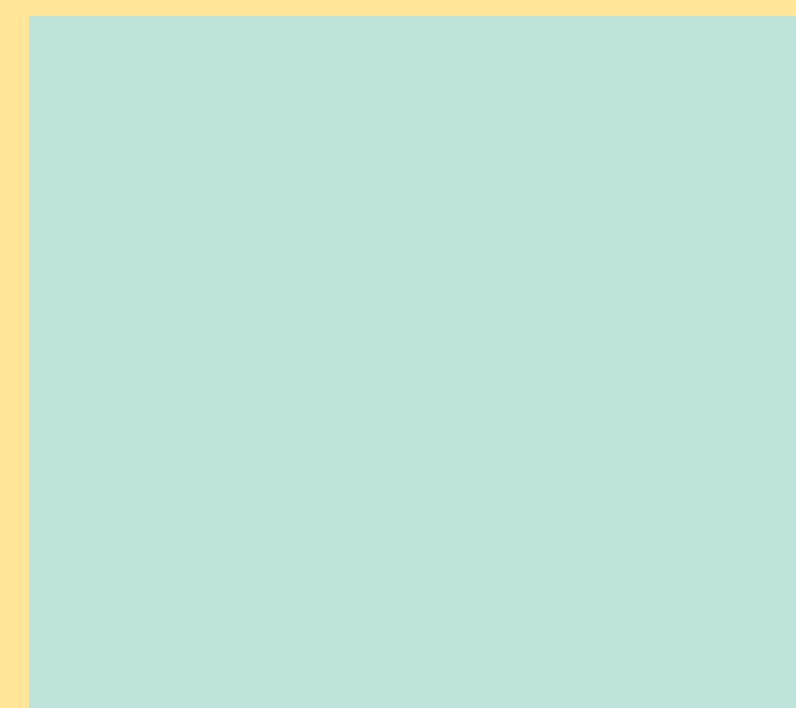


Hex: #2DAC95

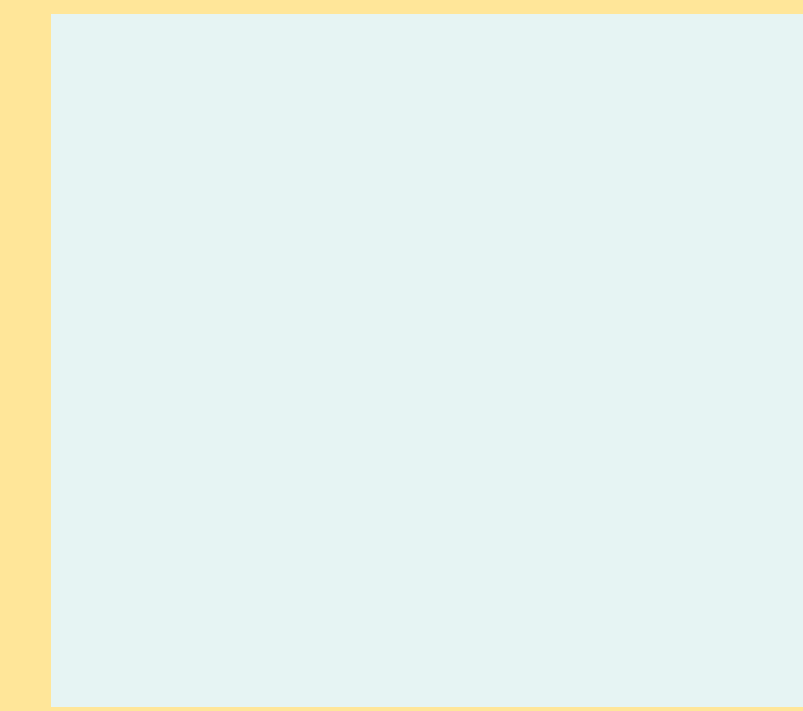


Hex: #00664F

Secondary brand colours



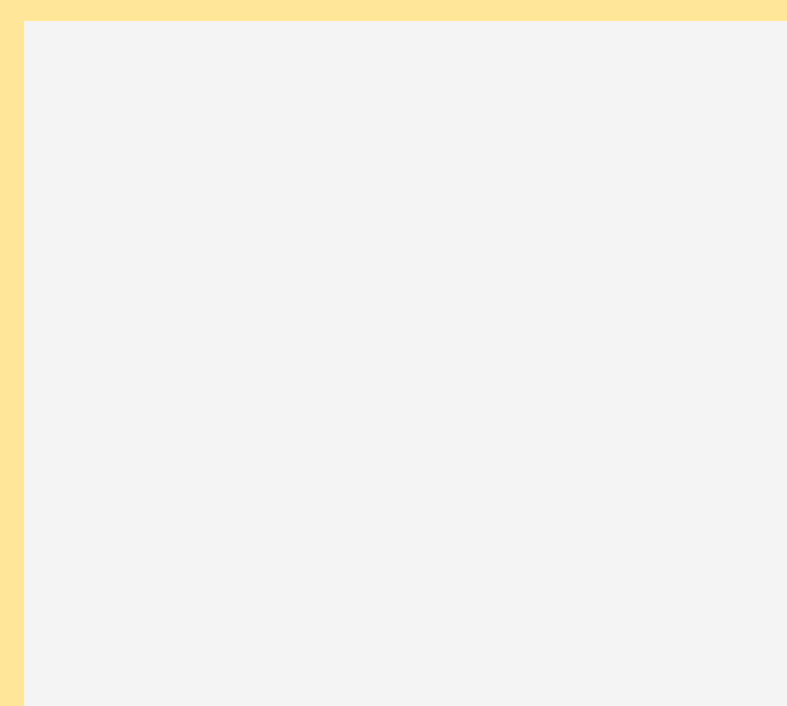
Hex: #BEE3DB



Hex: #E6F4F3



Hex: #00205B



Hex: #F4F4F4



Hex: #505554



Hex: #13322B

Investigating Aerobic Exercise for Improving Sleep Quality in Primary Insomnia: A Narrative Review

Mackenzie Mayers, BSc, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada

Introduction

- Primary Insomnia (PI) is a global concern. In Canada, it affects up to 48% of the population depending on the definition used.
- It is often characterized as a disorder of hyperarousal resulting from chronic activation of the neuroendocrine system in response to stress.
- Daytime symptoms of chronic insomnia can significantly reduce an individual's quality of life.
- First-line therapies emphasize the use of cognitive behavioural therapy and pharmacological agents which can be expensive and are not free of adverse effects.

Objectives

The objective of this study was to investigate the role of aerobic exercise in improving sleep quality in primary insomnia.

Search Methods

- A general literature search was conducted using PubMed and Cochrane for primary insomnia AND treatment to assess the available resources using the search terms “Insomnia AND Exercise,” “Primary Insomnia AND Exercise,” and “Primary Insomnia AND Aerobic Exercise.”
- Results in PubMed were filtered to include randomized controlled trials (RCT), systematic reviews with meta-analyses, human studies, and studies that were published within the last 10 years.
- Results in Cochrane were filtered to include trials and reviews, published between 2010 and 2023.
- Across both databases, 859 articles were generated, of which 4 met all criteria and were included in this review; two RCTs and two systematic reviews with meta-analyses were used for this review.

Table 1. PICO framework

Population	Interventions	Outcomes
• Adults with Primary Insomnia	• Aerobic Exercise	• Sleep Quality as measured via the PSQI, ISI, ASI, and ESS

Results

Table 2. Aerobic Exercise (RCTs)

Authors	Intervention	Comparison	Results
Tseng T-H et al., 2020	A tailored 12-week aerobic exercise prescription comprising three-50-minute exercise sessions per week, under supervision	1-hour educational programs with no exercise	Statistically significant improvements were observed in sleep quality following the 12-week aerobic exercise program. Total PSQI scores, as well as all subscales of the PSQI, decreased in the intervention group ($p < 0.001$). Objective sleep parameters did not demonstrate significant changes.
Baron P et al., 2023	A 12-week exercise program incorporating 3 weekly sessions, each of = lasting 1 h and 15 min (225 min per week). Active walking was performed outdoors if the weather allowed it or on an indoor treadmill.	No prescribed exercise intervention	Statistically significant reductions in ISI scores ($p < 0.001$) were recorded following the 12-week aerobic exercise program. Changes in ISI score correlated with changes in batyphase value ($p < 0.001$), mean night-time temperature and core temperature amplitude.

Table 3. Aerobic Exercise (Systematic Reviews With Meta-Analyses)

Authors	Intervention	Comparison	Results
Xie Y et al., 2021	Mind-body exercises or physical exercise. Exercise programs ranged from 2 to 12 months.	Non-exercise interventions or waitlist	Exercise interventions resulted in statistically significant effects on sleep quality according to the PSQI ($p < 0.00001$). Statistically significant differences were noted in ISI scores following exercise intervention ($p = 0.007$). Statistically significant decreases in ESS scores were noted following exercise intervention ($p < 0.00001$)
D'Aurea CVR et al., 2022	Mind-based exercises (Yoga and Tai Chi), aerobic, or resistance exercises. Exercise programs ranged from 10 to 50 minutes for 1 to 3 sessions per week	No treatment or education programs	A mean decrease of 3.17 in points (PSQI) were noted following exercise interventions. Aerobic exercise has a 4.4 score difference between the intervention and control groups. Statistically significant improvements in ISI and ASI scores following the exercise interventions.

Mechanism of Action

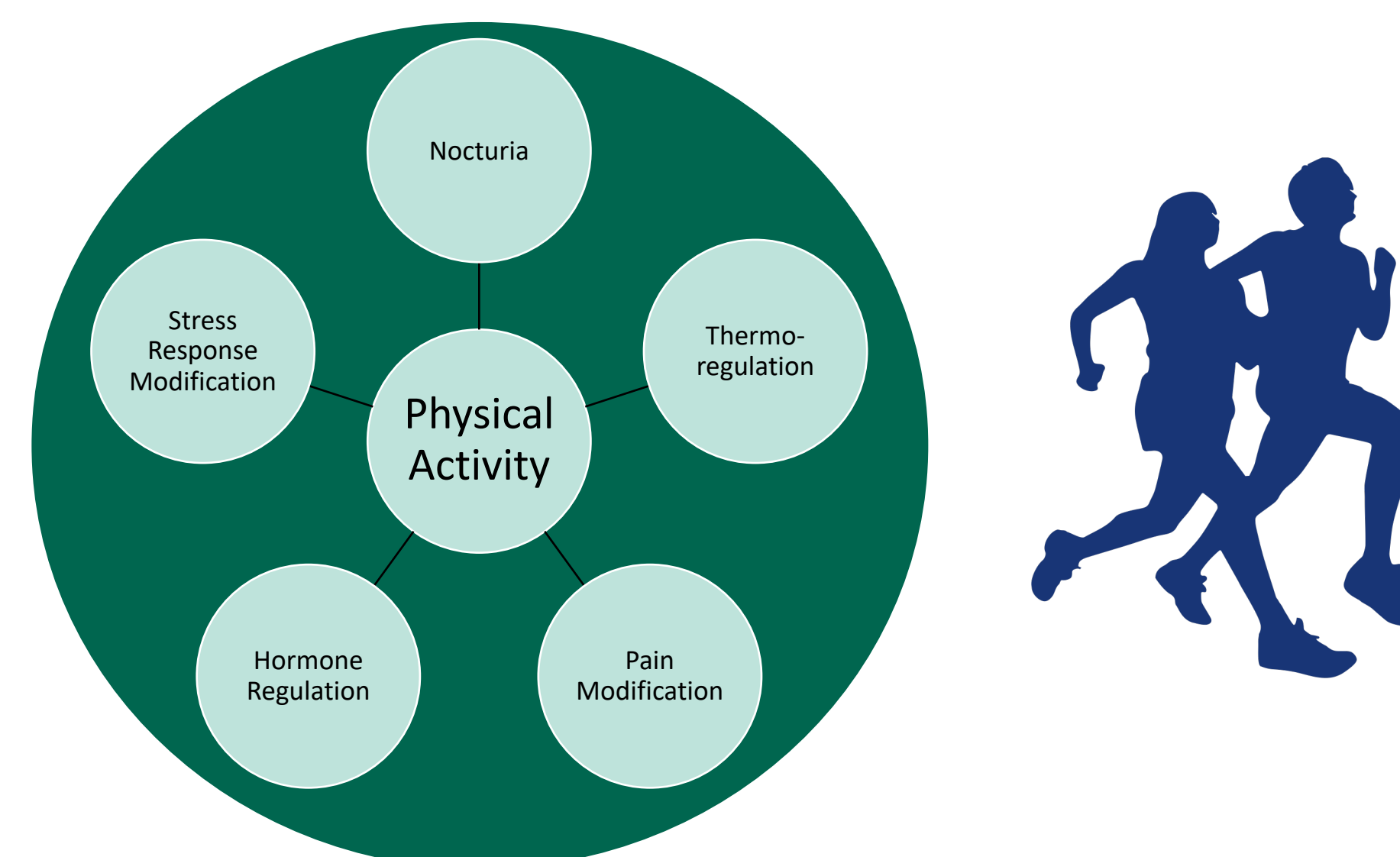


Figure 1: The potential mechanisms of action of aerobic exercise

Discussion

Strengths

- Clearly outlined outcome measures, inclusion and exclusion criteria
- No commercial or financial conflicts of interest

Limitations

- Small sample sizes
- Some participants continued to use pharmaceutical sleep aids which may have skewed the results despite having been potentially controlled for
- Only one study included individuals from a larger age demographic
- Uneven gender distribution between studies
- The meta-analyses included a large variety of exercise forms and various frequencies and durations were used
- Exercise type classifications were not well-defined in the meta-analyses
- Insomnia criteria not explicitly cited in the meta-analyses which hinders the specificity of the review outcomes

Further Research

- Additional research needs to be further investigated to cultivate a better understanding of intervention specifications—type, duration, frequency, and gender specificities
- Larger sample sizes and studies longer in duration are needed to strengthen the quality of evidence and more confidently determine the magnitude of benefit.

Conclusion

Based on the available evidence, encouraging aerobic exercise may be a useful method to support the improvement of sleep quality in patients with primary insomnia. Aerobic exercise is a safe and cost-effective intervention for clinical consideration.

Evaluating Yoga as Adjunctive Treatment in the Management of Type 2 Diabetes: A Narrative Review

Nour Nafisa, CCNM student, ⁽¹⁾ Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada

Introduction

- Approximately 462 million individuals are diagnosed with type 2 diabetes mellitus (T2DM) globally.
- T2DM is a chronic metabolic disorder characterized by hyperglycemia which if left untreated may result in target organ damage.
- The pathophysiology of T2DM involves two main driving factors: Reduced insulin secretion by pancreatic islet β -cells and insulin resistance.
- Treatment is commonly a combination of pharmacological therapy and lifestyle interventions; however, these are not without adverse effects.
- Yoga is a mind-body practice that originated in India 5000 years ago with an aim to harmonize, the body, mind, and emotions

Objectives

The aim of this review is to explore the efficacy of yogic practice when compared to placebo for the adjunctive management of T2DM.

Search Methods

- PubMed, Medline and Web of science were the databases searched
- Limits were used to refine results to publication dates between 2002-2023 in English and included only RCTs and systematic reviews with meta-analysis using human subjects only. GRADE was used to assess quality of studies.
- Two randomized controlled trials (RCT) and one systemic review with meta-analysis were selected that met the PICO criteria. Only the RCTs not summarized in the systematic reviews and meta-analyses were summarized in this review.

Table 1. PICO framework

Population	Intervention	Comparison	Outcomes
• Adults diagnosed with T2DM	• Yogic practice involving movement with or without breathing exercises	• Usual Activity	Primary: • Fasting blood glucose (FBG)

Results

Table 2. Results of randomized controlled trial of yoga on T2DM

Title	Yogic practice and diabetes mellitus in geriatric patients
Authors	Beena RK, Sreekumaran E
Methodology	Intervention <i>Yoga group:</i> Subjects participated in a 90 min yoga session per day for 6x/weeks for 3 months. The yoga sessions consisted of 15 minutes of breath-control exercises, 10 minutes of warm-up exercises, 50 minutes of yogic posture, and 15 minutes of relaxation postures <i>Control group:</i> Participants were asked to maintain their regular activities and did not begin any new exercise program Patients were subdivided based on their HbA1c percentage: Group 1: HbA1c 8.6–9.7 % Group 2: HbA1c 9.8–10.7 % Group 3: HbA1c 10.8– 12.7 % Sample (N) 143 elderly patients between the ages of 60-70 years old with a diagnosis of T2DM. Seventy-three participants in the yoga group.
Results	Treatment group 1: Reduction in FBG levels from 179.7 ± 6.23 to 140 ± 6.02 mg/dl (20 %), however, in the placebo group 1, there was a significant increase from 148 ± 2.08 to 150.97 ± 2.28 mg/dl was observed. Treatment group 2: Reduction in FBG levels from 184.12 ± 7.07 to 146.81 ± 5.53 mg/dl (20 %), however, in control group 2, there was a significant increase (P=0.036) from 179.81 ± 6.63 to 183.71 ± 6.89 mg/dl Treatment group 3: Reduction in FBG levels from 176.93 ± 8.7 to 142.21 ± 7.93 mg/dl (19 %), however in control group 3, no significant changes was observed
Quality of research	Moderate Quality

Table 3. Results of randomized controlled trial of yoga on T2DM

Title	Influence of yogic treatment on quality of life outcomes, glycemic control, and risk factors in diabetes mellitus
Authors	Agrawal RP, Aradhana R, Hussain S, Beniwal R, Sabir M, Kochar D.
Methodology	Intervention <i>Yoga Group:</i> 60 minutes of supervised yoga exercises daily or at least 5X/week at a yoga center for 3 months. Yoga practice consisted of 5 minutes of health rejuvenating exercises followed by 21 minutes of Asanas postures for stretch relaxation followed by 7 minutes of abdomen exercises. On alternate days subjects underwent 30 minutes of additional relaxation or meditation exercise which includes breathing exercises and a chance for reflection on moral value <i>Control Group:</i> On their regular conventional therapy for T2DM or usual daily activities at home. Sample (N) 154 patients with diagnosis of T2DM. There were 82 participants in the yoga group.
Results	Statistically significant reduction in FBG value in the yoga group compared to control group (mean change 33.25 vs 1.18 mg/dl, p<0.0001).
Quality of research	Moderate Quality

Table 4. Results of systematic review with meta-analysis of yoga on T2DM

Title	Effects of Yoga on Blood Glucose and Lipid Profile of Type 2 Diabetes Patients Without Complications
Authors	Chen S, Deng S, Liu Y, Yin T.
Methodology	Search Strategy Cochrane Library, Medline, EMBASE, PubMed, Web of Science, and FMRS were used to conduct the search. The key terms used were yoga, exercise, physical activity, T2DM, FBG, FBS, FPG, RCT. Inclusion Criteria Randomized controlled trials using humans only, English language full text only, Patients with T2DM Yoga based treatment, Control group receiving usual care only, Age of less than 70 years, Duration of studies between 10-24 weeks, Selection of articles not limited to one geographical area Exclusion Criteria Gestational diabetes, Animal studies, Lack of confirmatory diagnosis of T2DM, No control group, only abstract and non-English language, Non- RCT Sample (N) 11 studies included with a total of 1,130 subjects within those 11 studies. Duration of yoga treatment ranged from 10-24 weeks with yoga sessions between 45– 120 min per day for 1–7X per week.
Results	Seven out of 11 studies found a statistically significant reduction of FBG in the yoga treatment group compared to control. (SMD = -0.92; 95%CI: -1.55, -0.29; p = 0.004).
Quality of research	High Quality

Discussions

Strengths

- Trials varied in length between 3 months up to 6 months. These timelines were sufficient to observe a change in the treatment group.

Limitations

- Studies had a small sample size which decreases the internal validity of the studies.
- Majority of study participants are of Indian origin which reduces the external validity of the studies.

Proposed mechanism of action of Yoga

- Psychological, neurological, endocrine, and immunological mechanisms are all in interplay for producing favorable glucose control in patients with T2DM

Figure 1: Proposed mechanisms of action

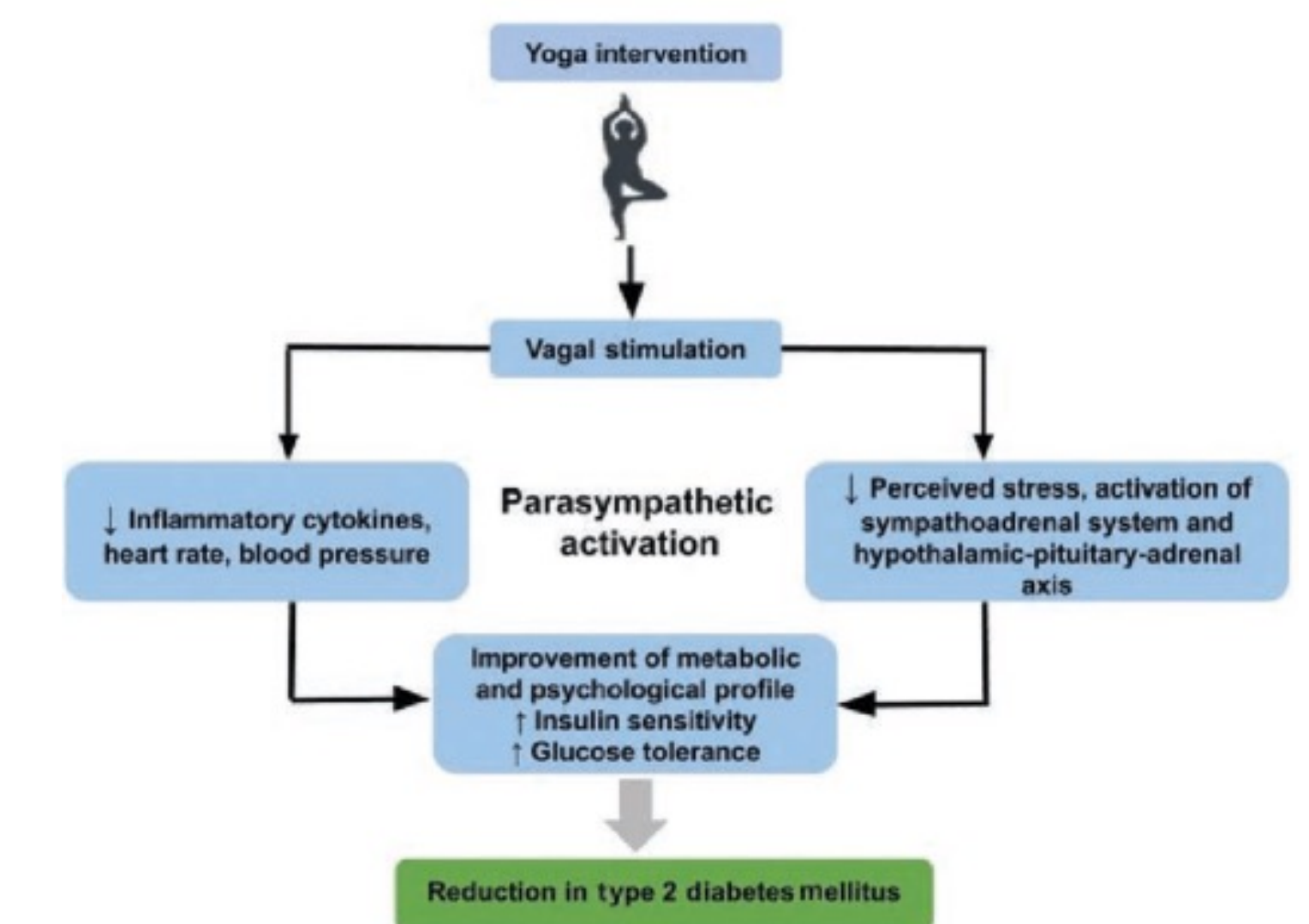


Figure reference: Podder V, Srivastava V, Kumar S, et al. Prevalence and Awareness of Stroke and Other Comorbidities Associated with Diabetes in Northwest India [published correction appears in J Neurosci Rural Pract. 2020 Jul;11(3):e1]. J Neurosci Rural Pract. 2020;11(3):467-473. doi:10.1055/s-0040-1709369

Conclusions

Evidence suggests that yoga practice is a promising treatment for management of T2DM acting through mechanisms of decreasing fasting blood sugar, insulin resistance, and improving insulin sensitivity. Further research with larger sample sizes and representation of various ethnic backgrounds is warranted

For references or further questions, please email: nafisa@ndent.cnm.edu

Dietary counselling plus omega-3 supplementation in the treatment of generalized anxiety disorder: Results of a randomized wait-list controlled pilot trial (the “EASe-GAD Trial”)

Monique Aucoin ND MSc (1,2), Laura LaChance MD MSc (1,3), Inge van der Wurff PhD (4), Meagan McLaren MSc (1), Sasha Monteiro MSc ND (1), Sean Miller (5), Andrew Jenkins MSc (6), Elham Sabri MSc (7), Kieran Cooley ND (1,8,9,10) 1. Canadian College of Naturopathic Medicine, ON, Canada; 2. University of Guelph, ON, Canada, 3. McGill University, QC, Canada, 4. Open University of the Netherlands, Netherlands, 5. Peer Connections Manitoba, MB, Canada, 6. Lipid Analytical Laboratories, ON, Canada, 7. Ottawa Hospital Research Institute, ON, Canada, 8. Southern Cross University, Australia, 9. University of Technology Sydney, Australia, 10. University of Toronto, ON, Canada



Introduction

- Anxiety disorders are common, not all people benefit from available treatments.
- Clinical evidence suggests that dietary modification and omega-3 supplementation can improve symptoms of depression; less is known about anxiety.

Objectives

- Assess the feasibility and acceptability of a dietary counselling and omega-3 fatty acid supplementation intervention.
- Assess changes in anxiety symptom severity, diet quality, self-efficacy, mindful eating, quality of life, and biomarkers.

Methods

- Randomized, wait-list controlled pilot trial.
- 50 adult women with generalized anxiety disorder.
- Intervention: 7 sessions of dietary counselling (over 12 weeks) + omega-3 supplementation (2659mg EPA + 532mg DHA); Counselling included education, dietary recommendations, motivational interviewing, mindful eating and provision of food items, recipes, other resources.

Outcomes:

- Feasibility: time to recruit 50 participants, questionnaire completion
- Acceptability: attendance, supplement compliance, satisfaction questionnaire
- Anxiety symptoms severity
- Diet quality
- Mindful eating
- Self-efficacy
- Labs (OmegaScore, cholesterol, blood sugar, vitamins)

Results

Primary Outcomes:

- Time to recruit 50 participants: 8 months
- Questionnaire Completion: 46 out of 50 (92%)
- Average session attended: 6.4 out of 7 (91%)
- Average supplement compliance: 88.6%
- Satisfaction: “my experience in the study was positive”

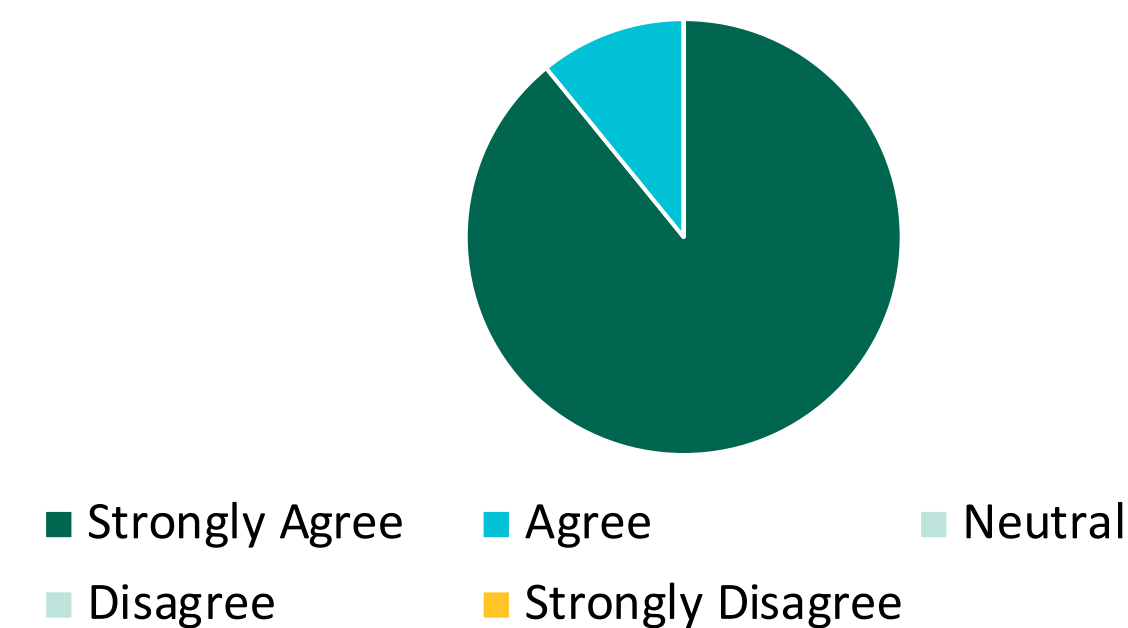


Figure 1. Participant satisfaction with the study experience

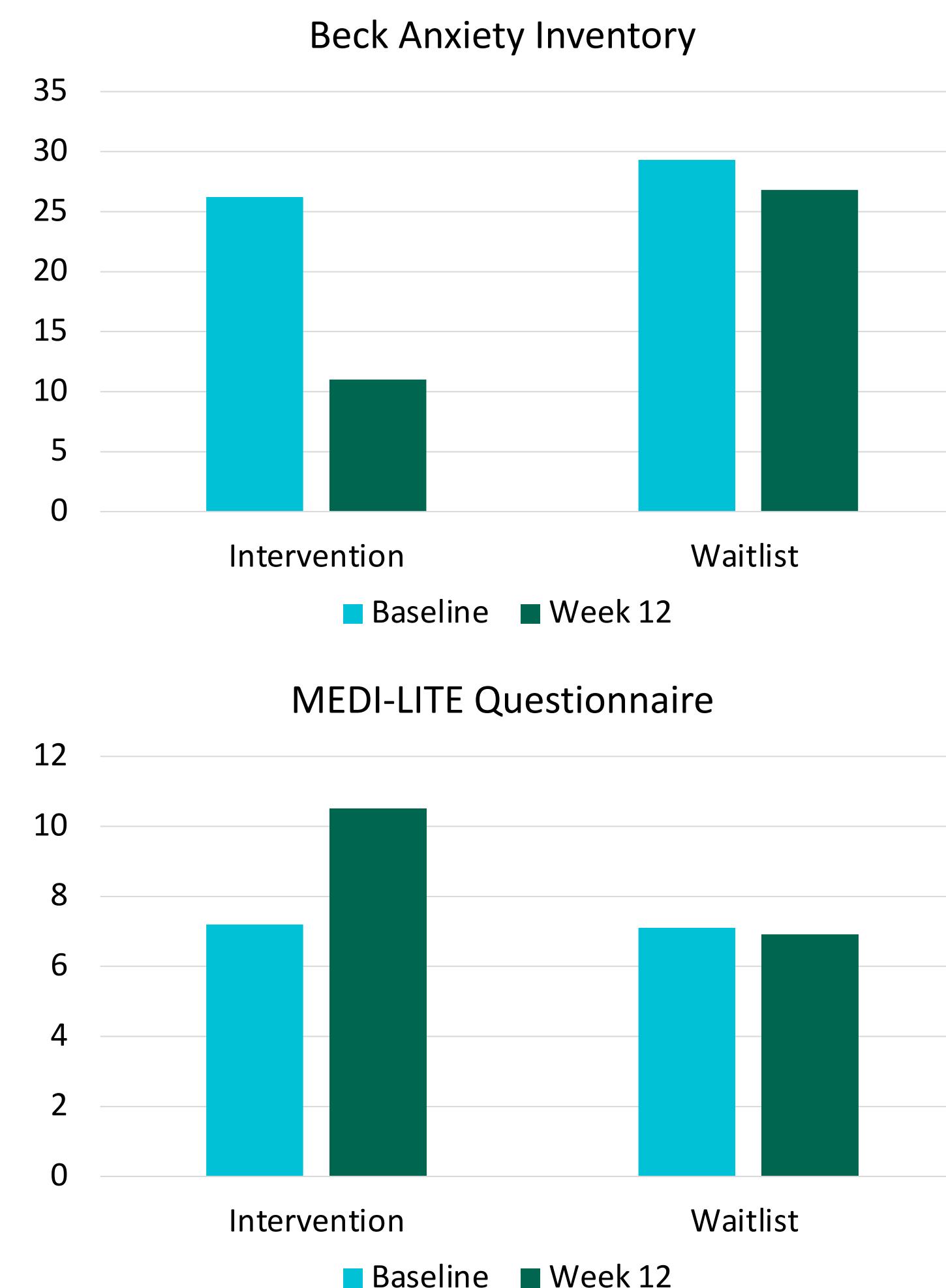


Figure 2. Changes in Beck Anxiety Inventory and MEDI-LITE scores

Liked Most

Behaviour Change Support
Accountability, encouragement, goal setting, support, individualization, manageable, coping techniques, confidence, motivation, opportunity for reflection

Intervention Delivery
Study visits, 1-on-1 visits, in-person visits, hybrid delivery, program length, recommendations, recommendations, provider qualities

Materials Provided
Food, gift cards, recipes, handouts, educational materials, meal ideas, mindfulness handout, study website, SWAP technique

Outcomes
Knowledge, improved mental health, new habits, trying new things, more creative meals, improved health of family

Omega-3 Supplement
Felt better, more energy, less anxiety, improved hair/skin, improved bowel function, well tolerated, less inflammation, option for people who don't eat fish

Research Components
Bloodwork/finger prick test, long questionnaires

Intervention Delivery
Commute to in-person visits, interest in longer visits/program, balance study with activities in life

Foods
Disliked some of the foods, lack of confidence with new foods

Resources
Recipes (didn't access them), videos, educational materials

Omega-3 Supplement
Needing to take 4 capsules, size of capsules, adverse effects, remembering to take it

Liked Least

Figure 3. Themes from participant responses to the open-text questions: Components that the participants liked most and least

Quotes

“Overall excellent program, and truly had a positive impact on our family's health!”
 “[the program was] non-judgmental. The goals felt realistic and like things I could actually accomplish.”
 “[The best thing was] the health benefits, I felt better.”

Results

Secondary Outcomes:

- Anxiety severity: A statistically significant difference in score at 12 weeks, -13.72 (-18.54,-8.90), p-value<0.0001.
- Diet quality improved (7.2 to 10.5)
- Mindful eating behaviour and self-efficacy improved.
- OmegaScore increased (3.58 to 7.18), other labs did not change.

Discussion

- Findings in line with previous depression studies.
 - Complex intervention with many possible mechanisms of benefit.
- Limitations
- No study visits during wait period.
 - Possible selection bias – may only generalize to people who self-select for a nutritional intervention.

Conclusions

This study was highly feasible and acceptable. Participation was associated with an improvement in secondary outcomes including anxiety severity, diet quality, and OmegaScore.

For references or further questions, please Email maucoin@ccnm.edu

Funding/Support Provided by: Ekhangastiftelsen, AquaOmega, Mitacs Accelerate, Lipid Analytical Laboratories and Sobey's Inc

Current perceptions and attitudes towards vaginal seeding in health care practitioners: A narrative review

Sonya Arrigo, CCNM student ⁽¹⁾, Neda Ebrahimi, PhD ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada

Introduction

- Vaginal seeding (VS), a microbial restoration procedure applied to babies born via cesarean section (C/S), involves transfer of vaginal secretions via a sterile gauze to a newborns mouth, face and body.
- VS may counteract health outcomes associated with C/S such as obesity, autoimmune disease, and asthma.
- Current gaps in knowledge on long-term outcomes, safety, cost and challenges of VS, preclude the wider clinical application.
- Understanding the perceptions and attitudes of health care providers (HCPs) and their willingness to adopt this technique will allow for opportunities to fill some of these knowledge gaps.

Objectives

Explore the current literature and guidelines outlining the perceptions and recommendations surrounding the practice of VS to provide microbial restoration in C/S delivered babies.

Search Methods

- A search of Google Scholar, EMABSE, and PubMed with the terms [Vaginal Seeding, Vaginal seeding safety, Vaginal microbial restoration and restoring microbiome] AND [midwives, obstetricians, delivery nurses, doulas] AND [perceptions, attitudes, opinions], yielded 9 results with only 2 meeting inclusion criteria.
- Inclusion criteria are clinical trials, surveys, scoping and systematic reviews. Exclusion criteria were articles published before 2004, randomized controlled trials (RCTs) and meta-analysis.

Results

Figure 1: Research of published VS literature

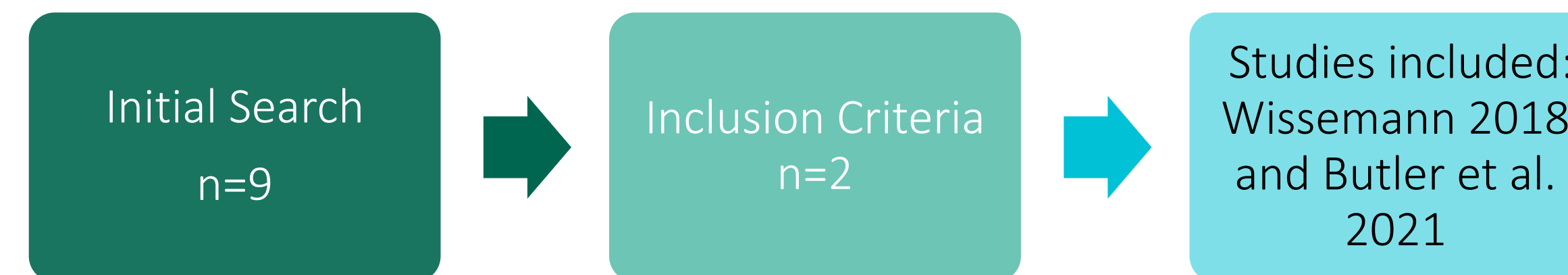


Table 1. Results of Findings

Author	Study Type	Methods	Results and Key Findings
Wissemann 2018	Perspective Piece in <i>Women and Birth Journal</i>	Study did not reference which method it used to gain perspectives of midwives. Access to full article was restricted. Only access to Abstract, Aim and Implications.	Western Australian women are demanding the practice of VS in clinical setting. HCP and Midwives knowledge is lacking in regards to risks, benefits and procedure of VS.
Butler et al. 2021	Mixed Methods Study Phase one interview (n=15) Phase two online questionnaire (n=264)	Sequential mixed-methods study on views of pregnant women in New Zealand (NZ) on VS. Phase one: semi structured interview with women participating in clinical trial of VS. Phase two: online questionnaire of pregnant women not in trial.	Over 80% of questionnaire respondents n=133, reported positive or neutral initial reaction to VS. Respondents who had heard of practice prior to questionnaire n=51, had a positive initial reaction Most women viewed VS as replicating a natural process and could possibly reduce the guilt associated with CS.

Current recommendations from the American College of Obstetricians and Gynecologists (ACOG) do not recommend VS outside of institutional review board-approved research. There are no other recommendations at this time.

Future Research: Currently three clinical trials (two RCTs and one pilot study) are registered and ongoing. All studies are set in the United States with anticipated publication between 2026-2029.

Discussions

Limitations

- We do not have an understanding of HCP views, attitudes and perceptions on VS in other regions such as Ontario, Canada or North America.
- One (Butler et al. 2021) of the two studies pertained to pregnant women, making it unapplicable towards HCP's views, but still relevant to overall attitudes and perceptions towards VS

Implications of Findings

- Emphasize need for further research on VS
- The limited data is influencing the HCP's approach to deliberating, recommending and implementing the practice in clinical settings.
- The procedure is being performed in a variety of settings, however there is no data on how often it is being performed, what the perceptions and attitudes towards VS the HCP who are performing it may contain.

Conclusions

Larger studies, including more surveys on perspective and attitudes on VS by HCP's are required. Overall, there are very few published surveys on VS. Insufficient widespread knowledge on VS can be contributing to the lack of surveys. More RCTs and meta-analysis are warranted to determine safety and risks.

For references or further questions, please email: sarrigo@ndnet.ccnm.edu

The Efficacy of *Boswellia serrata* on Managing Osteoarthritis in Adults: A Narrative Review

Jessie Nusselder, BScN, RN, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽¹⁾

1. Canadian College of Naturopathic Medicine, ON, Canada

Introduction

- Osteoarthritis (OA) affects 27% of people worldwide and is the leading cause of disability.
- OA impairs the ability to work, disrupts sleep, reduces mood, increases suicide ideation, and is linked to increased risk of coronary artery disease and myocardial infarction.
- Effective management strategies are key to reducing the burden of OA on quality of life.
- The American College of Rheumatology recommends nonpharmacologic interventions as first-line therapy.
- Boswellia serrata*, as a nonpharmacologic intervention, has the potential to address the underlying biochemical and inflammatory changes that constitute OA.

Objectives

To investigate the impact of *Boswellia serrata* on improving pain, stiffness, and function in individuals with OA and determine an optimal dosing regimen.

Search Methods

- Medline with full text, PubMed, CINAHL complete, and Cochrane were searched with the terms, "osteoarthritis and *Boswellia serrata* and WOMAC", which yielded 13, 22, 6, and 26 articles, respectively. Date of publication was filtered to articles from 2012-2023.
- 2 RCTs and 1 systematic review met criteria. Only RCTs not summarized in the systematic review and meta-analysis were included in this review.
- All participants within the included studies had previously been diagnosed with OA. *Boswellia serrata* was tested in isolation and combination product studies were not included.

Table 1. PICO framework

Population	Intervention	Control	Outcome
Adults with OA	<i>Boswellia serrata</i>	Placebo	Changes to WOMAC scores

Results

Table 2. *Boswellia serrata* extract (BSE)

Author & Study design	Intervention	Comparison	Results
Yu et al., 2020. Systematic review with meta-analysis.	3 studies on Aflapin BSE and 5-Loxin BSE at a dose range of 100 to 250 mg. Daily use for 4 weeks.	Placebo	BSE was better than placebo at improving pain, stiffness, and function after 28 days of continuous use and these results were statistically significant (p<0.00001). The Aflapin and 5-Loxin BSEs included in this study contained 20% or 30% 3-O-acetyl-11-keto-beta-boswellic acid (AKBBA), respectively.
Majeed et al., 2019. Double-blind RCT.	2 tablets of 169.33 mg of Boswellin BSE per day (338.66 mg per day). Duration of 120 days.	Placebo	A statistically significant decrease in WOMAC scores was seen among the Boswellin BSE after 120 days of treatment compared to the placebo group (p<0.001). This correlates to significant improvements in pain, stiffness, and function among adults with OA. The Boswellin BSE contained 30% AKBBA combined with beta-boswellic acid (BBA).
Karlapudi et al., 2023. Double-blind RCT.	50 mg capsule of Aflapin BSE BID (100 mg per day). Duration of 30 days.	Placebo	After just 5 days of treatment with Aflapin <i>Boswellia serrata</i> extract, WOMAC pain, WOMAC stiffness, WOMAC function, and total WOMAC scores showed a statistically significant improvement of 24.8%, 47.6%, 21.2%, and 23.58%, respectively (p<0.05). After 30 days, WOMAC pain, WOMAC stiffness, WOMAC function, and total WOMAC scores improved by 44.4%, 66.3%, 44.4%, and 48%, respectively (p<0.0001). The Aflapin BSE contained 20% AKBBA.

Figure 1:
The various anti-inflammatory actions of AKBBA.

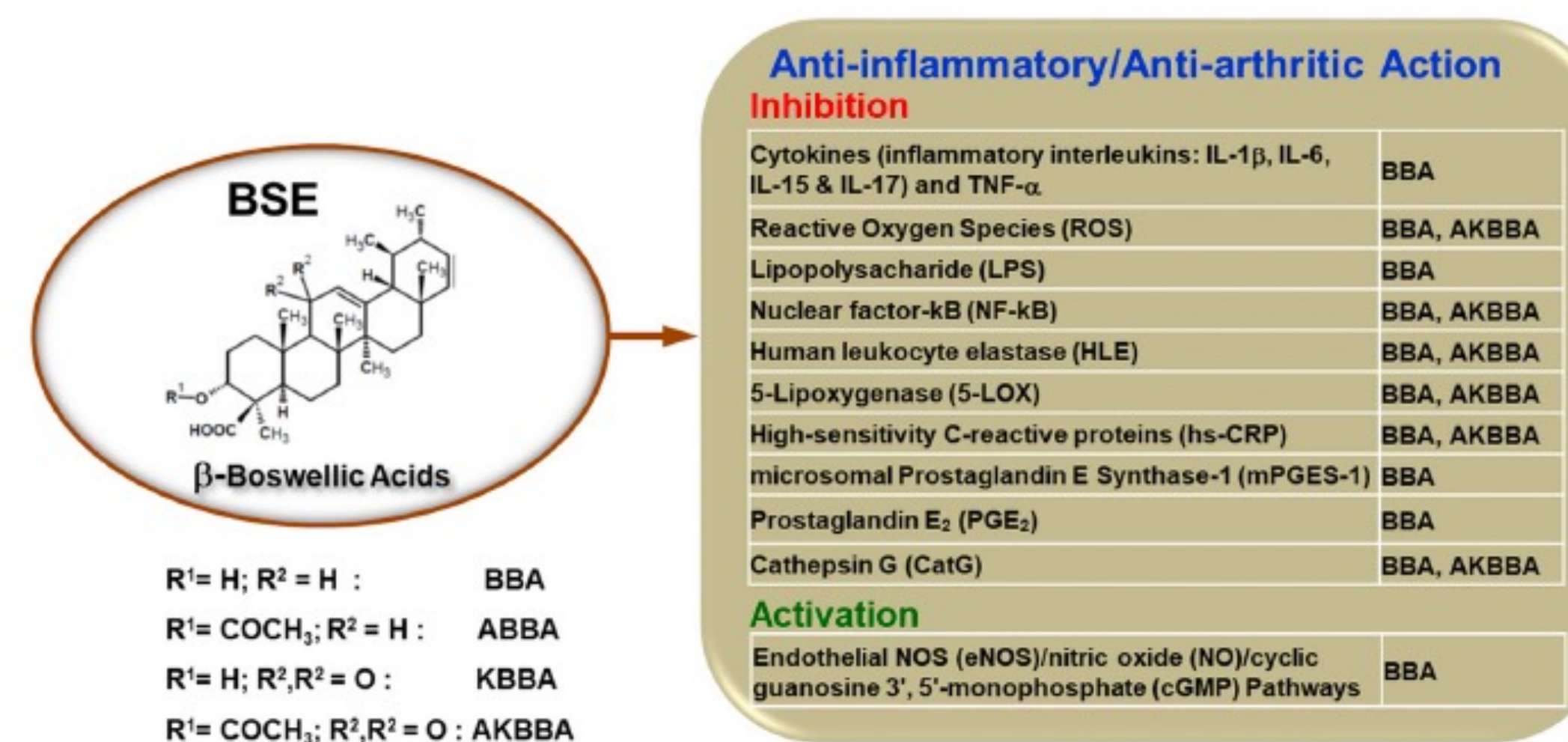


Figure 2:
The inhibitory effect of 20-30% AKBBA BSE supplementation on the 5-lipoxygenase (5-LOX) pathway.

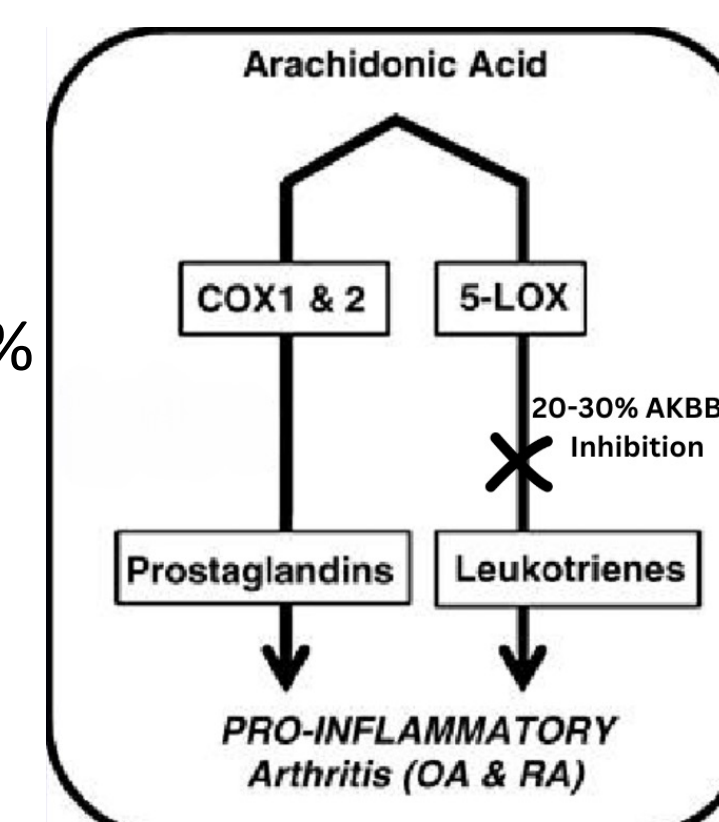


Figure references:
1. Majeed M, Majeed S, Narayanan NK, Nagabhushanam K. A pilot, randomized, double-blind, placebo-controlled trial to assess the safety and efficacy of a novel *Boswellia serrata* extract in the management of osteoarthritis of the knee. *Phytother Res.* 2019 May;33(5):1457-1468. doi: 10.1002/ptr.6338
2. Roschek B Jr, Fink RC, Li D, McMichael M, Tower CM, Smith RD, Alberte RS. Pro-inflammatory enzymes, cyclooxygenase 1, cyclooxygenase 2, and 5-lipoxygenase, inhibited by stabilized rice bran extracts. *J Med Food.* 2009 Jun;12(3):615-23. doi: 10.1089/jmf.2008.0133

Discussions

Clinical Application

- AKBBA is a specific active boswellic acid contained within BSE and considered the most potent 5-lipoxygenase (5-LOX) pathway inhibitor.
- 20% - 30% AKBBA BSEs were found to exert anti-inflammatory and anti-arthritis activity which improved WOMAC scores.
- Statistically significant improvements were seen at a dose range of 100 to 338.66 mg of BSE per day after a duration of 5 to 120 days.
- Evidence suggests a minimum dose of 100 mg per day of either 20% or 30% AKBBA BSE is needed to improve pain, stiffness, and function in individuals with OA. These improvements may be experienced as early as 5 to 7 days after initiating supplementation.
- The studies used either 5-Loxin, Aflapin, and/or Boswellin BSE products which are readily accessible for purchase online.

Safety profile of 20-30% AKBBA BSEs

- No adverse effects to any BSEs were reported in the included studies.
- AKBBA was not found to have toxic adverse effects when given at higher doses and is potentially considered safe for the treatment of OA in adults.

Limitations

- The heterogeneity in BSE dose and duration makes it difficult to conclude the optimal therapeutic dosing regimen for improving pain, stiffness, and function in adults with OA.
- Sample sizes were small and ranged from 48 to 70 participants across all included studies.

Conclusions

- The evidence suggests *Boswellia serrata* may be an effective intervention to improve daily function while reducing pain and stiffness in individuals with OA. Further studies with larger sample sizes are needed to strengthen recommendations around optimal dosing and selecting the most effective type of Boswellic acid extract.

For references or further questions, please email: jnusselder@ndnet.ccnm.edu

Evaluating the Effects of Ivy Gourd, Chromium, and Berberine in Adults with Type 2 Diabetes Mellitus: A Narrative Review

Sydney Lake, BSc, CCNM Student ⁽¹⁾, Adam Gratton, MSc, ND ⁽²⁾

1. Canadian College of Naturopathic Medicine, ON, Canada; 2. Institute of Medical Science, University of Toronto, ON, Canada



Introduction

- Type 2 diabetes mellitus (T2DM) rates have risen dramatically in Canada with approximately 11.7 million living with diabetes or prediabetes.
- Diabetes is diagnosed when an individual has a random plasma glucose of ≥ 11.1 mmol/L, fasting plasma glucose ≥ 7.0 mmol/L, or plasma glucose ≥ 11.1 mmol/L after a 75g oral glucose tolerance test or HbA1c $\geq 6.5\%$.
- Many pharmaceutical antihyperglycemic options exist but they are not without adverse effects.
- For individuals with HbA1c 1.5% below target range, non-pharmacologic options are considered first-line therapies. Pharmacologic interventions are first-line for individuals with HbA1c 1.5% above target range.

Objectives

The aim of this study was to evaluate the antihyperglycemic effects of three non-drug pharmacologic interventions, ivy gourd, chromium, and berberine in adults with T2DM.

Search Methods

- PubMed was used to search “*Coccinia indica* AND type 2 diabetes,” “*Coccinia grandis* AND type 2 diabetes,” “*Coccinia indica* AND diabetes,” “chromium AND type 2 diabetes,” “berberine AND type 2 diabetes” and “*Berberis vulgaris* AND type 2 diabetes.”
- The studies were refined to systematic reviews with meta-analyses and randomized control trials (RCT). Multiple meta-analyses were used if their studies had minimal cross-over. Individual RCTs could not be used if they were included in the meta-analyses.
- The search yielded 8 studies for ivy gourd, 68 studies for chromium, and 26 studies for berberine.

Table 1. PICO framework

Population	Intervention	Control	Outcomes
• Adults with T2DM	• Ivy Gourd (<i>Coccinia spp.</i>) • Chromium • Berberine	• Placebo	• FG

Results

Table 2. Ivy Gourd (*Coccinia spp.*) versus Placebo

Authors	Intervention	Results
Wasana et al., 2021	Adults with newly diagnosed T2DM received either 500 mg freeze-dried <i>Coccinia grandis</i> or 500 mg placebo for 3 months.	Significant differences in FG between placebo and intervention groups were demonstrated at the end of the study.
Kuriyan et al., 2008	Adults with newly diagnosed T2DM received 500 mg <i>Coccinia cordifolia</i> or placebo twice per day for 90 days.	A significant decrease in FG was found in the intervention group compared to placebo.
Khan et al., 1980	Adults with T2DM received either freeze-dried <i>Coccinia indica</i> or placebo for 6 weeks.	A significant reduction in FG was found in the intervention group compared to placebo.

Table 3. Chromium versus Placebo

Authors	Intervention	Results
Zhao et al., 2021	Meta-analysis of RCTs studying various forms of chromium versus placebo.	10 RCTs were included, and 7 found no significant reduction of FG.
Yin & Phung, 2015	Meta-analysis of RCTs studying various forms of chromium versus placebo.	14 RCTs met the criteria, and 11 of the studies measured FG. Brewer’s yeast significantly reduced FG compared to placebo.
Farrokhian et al., 2020	Adults with T2DM received either 200 μ g chromium picolinate or placebo for 12 weeks.	Chromium picolinate significantly reduced FG compared to placebo.

Table 4. Berberine versus Placebo

Authors	Intervention	Results
Guo et al., 2021	Meta-analysis of RCTs studying berberine.	11 RCTs compared berberine to placebo. Berberine demonstrated a significant reduction in FG compared to placebo.
Shidfar et al., 2012	Adults with T2DM received either 6 capsules of 500mg berberine or placebo per day for 3 months.	Significant reduction in FG was found with berberine compared to placebo.
Gu et al., 2010	RCT where the berberine group received 1g per day for 3 months.	Significant reduction in FG was found compared to placebo.

Discussions

Strengths

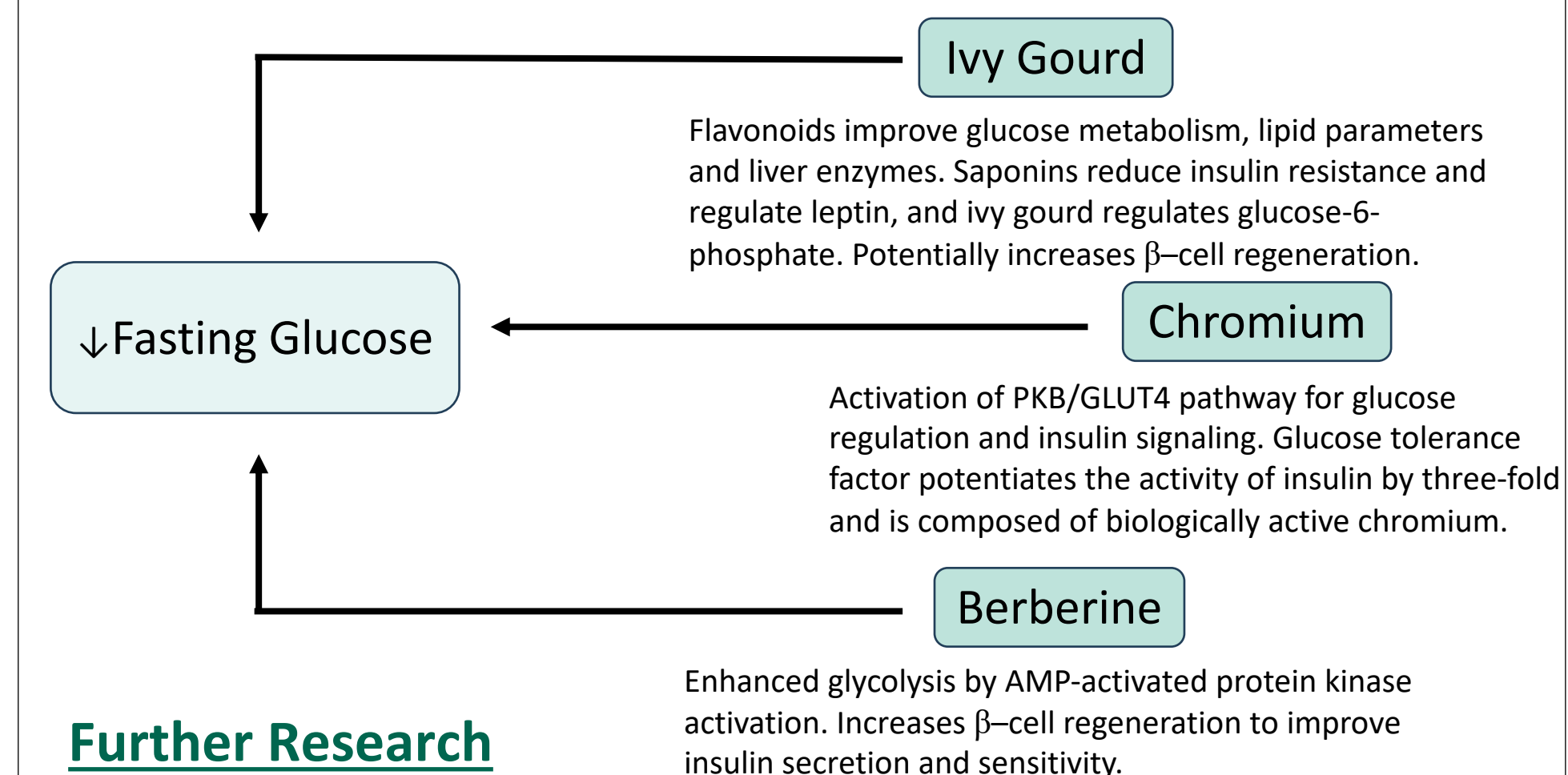
- All of the RCTs were double-blinded
- Most RCTs used individuals with newly diagnosed T2DM
- Most RCTs did not have individuals change their diet and lifestyle

Limitations

- Small sample sizes throughout the studies
- One of the RCTs used an unknown dose for ivy gourd
- Some RCTs gave diet and lifestyle advice which could have contributed to further reduction in FG

Clinical Application

- Berberine should be considered as an adjunct to lifestyle changes to help reach glucose targets with minimal side effects compared to other pharmaceuticals.



Further Research

- The ivy gourd studies found significant improvement in FG, but further research is needed to determine the therapeutic dose, and if certain *Coccinia* species are more efficacious than others.
- Chromium had contradictory evidence between the different forms. More research is needed to determine the most useful form.

Conclusions

Between the three therapies, berberine is the best option to be used as an antihyperglycemic agent for the treatment of T2DM. Specific forms of chromium may be useful and ivy gourd shows promise, but further research is needed.