Complementary and Integrative Health Strategies Post-Stroke

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Learning Objectives

- Discuss the state of the evidence for select Complementary and Integrative Health therapies post-stroke
- Describe several CIH therapies with potential benefits for motor symptoms following stroke
- List several CIH therapies with potential benefits for mental health, cognitive function and/or overall quality of life following stroke

Disclosures

- I have no disclosures relevant to this topic or presentation.

Overview

- What is complementary and integrative health (CIH)?
- CIH Post-Stroke
  - Acupuncture
  - Tai chi
  - Yoga
  - Herbal medicine
  - Other CIH
- Summary & Conclusions

What is Complementary and Integrative Health?

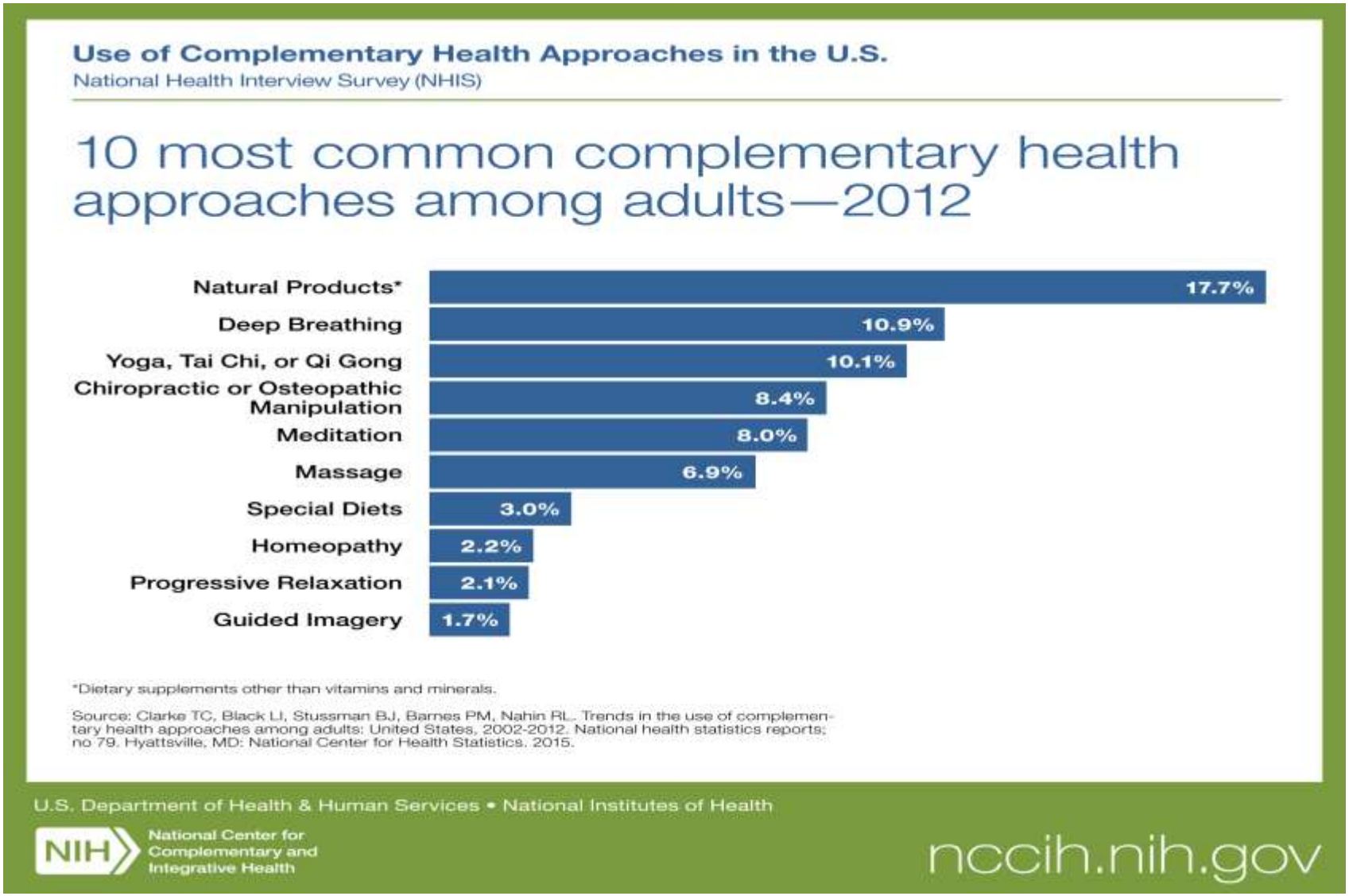
- Complementary = Use of non-mainstream health practices together with conventional medicine.
- Integrative = Complementary plus conventional approaches combined in a coordinated way.

Source: National Center for Complementary and Integrative Health (NCCIH). https://nccih.nih.gov/health/integrative-health . Accessed 9/16/19

Common Categories of CIH

- Natural products
  - Herbs
  - Vitamins and minerals
  - Probiotics
  - ”Dietary supplements”
- Mind and Body Therapies
  - Yoga
  - Acupuncture
  - Tai chi
  - Qigong
  - Chiropractic and osteopathic manipulation
  - Massage
  - Meditation

CIH Utilization in the United States



Source: National Center for Complementary and Integrative Health. https://nccih.nih.gov/file/3039 . Accessed 9/16/19

Select Types of Acupuncture

Full body

Auricular

Source: National Center for Complementary and Integrative Health. https://nccih.nih.gov/news/multimedia/images/ Accessed 9/16/19

(M)y PICO Model of Evidence-informed Practice

- M: Methods
- P: Population
- I: Intervention
- C: Comparison
- O: Outcome

Acupuncture

- M: Multi-center, single-blind, RCT
- P: n=862 w/ limb paralysis 3-10 days post-stroke
- I: Acupuncture 5 x/week for 3-4 weeks + usual care
- C: Usual care
- O: No statistically significant difference in death or institutionalization
  - Trend for reduced death (20.7% vs. 25.8%, OR: 0.75 [95% CI: 0.54-1.05]
  - For those receiving >/= 10 treatments, OR:0.68 [0.47-0.98)

Zhang et al. Stroke. 2015.

Acupuncture

- M: RCT
- P: n=250
- I: Full body acupuncture x 18 treatments over 3 weeks
- C: No acupuncture
- O: Evaluated at 7 week follow-up
  - Primary: NIH Stroke Scale
    - NIHSS: Significant improvements ($p<0.001$)
  - Secondary: Fugl-Meyer Assessment, bedside swallowing assessment, videofluoroscopic swallowing study (VFSS), MMSE, MoCA, AEs
    - FMA: No overall change ($p=0.23$), improved lower extremity scale ($p=0.02$)
    - BSA: Improved in those w/ swallowing disorder ($p=0.04$)
    - VFSS: Improved ($p<0.001$)
    - MMSE: Improved ($p<0.001$)
    - MoCA: Improved ($p=0.001$)
    - AEs: All mild

Chen et al. BMC Complement Altern Med. 2016.

Acupuncture Post-Stroke: Details

Table 4 Value changes (week 7-week 0) of variables by independent samples *t*-test (PPS)

Variable	Group (N)	week 7-week 0 Mean (SD)	95 % CI of the Difference	*T*	*P*
NIHSS	AG(120)	−4.85(1.63)	−1.22, −0.43	−4.13	<0.001
	NAG(121)	−4.05(1.52)			
FMA	AG(120)	18.29(7.32)	−0.77, 2.85	1.13	0.259
	NAG(121)	16.60(10.41)			
FMA (UE)	AG(120)	7.26(3.40)	−0.68, 1.00	0.14	0.707
	NAG(121)	7.10(3.22)			
FMA (LE)	AG(120)	11.83(3.72)	0.18, 2.01	5.52	0.020
	NAG(121)	10.73(3.54)			
VFSS	AG(68)	4.51(1.39)	0.27,1.16	3.17	0.002
	NAG(65)	3.80(1.20)			
MMSE	AG(78)	2.95(1.26)	0.39, 1.20	3.90	<0.001
	NAG(71)	2.15(1.23)			
MoCA	AG(78)	3.24(1.40)	0.38, 1.23	3.77	<0.001
	NAG(71)	2.44(1.19)			

FMA (UE) = FMA subscale of upper extremity (66 points); FMA (LE) = FMA subscale of lower extremity (34 points)

Chen et al. BMC Complement Altern Med. 2016.

Acupuncture vs. Acupuncture for Balance

- M: Single-blind RCT
- P: n=30 post-stroke
- I: Acupuncture with “stimulation”(A+)
- C: Acupuncture alone (A)
- O:
  - Muscle strength: Increased in affected and unaffected sides in A+ group only
  - Displacement around CoG: Improved in A+ group only
  - 6m Walk: Equal improvement
  - Get-up-and-Go: Equal improvement

Liu et al. Am J Chin Med. 2009.

Acupuncture: PS MCI

- M: Single-blind RCT
- P: n=126 w/ post-stroke mild cognitive impairment
- I: Acupuncture (A) or acupuncture + nimodipine (A+N)
- C: nimodipine alone (N)
- O: MoCA
  - N: 16 +/- 11 % improvement
  - A: 21 +/- 14 % improvement
  - A + N: 30 +/- 20% improvement ($p<0.05$)
    - > % had MoCa increases >12% in A and N+A, then N alone

Wang et al. BMC Complement Altern Med. 2016.

“Dry Needling”

- M: single-blinded RCT
- P: n=34 post-stoke patients with lower extremity spasticity
- I: single session of dry needling of the gastrocnemius and tibialis anterior
- C: no treatment
- O: Ashworth scale-measured spasticity
  - Significant decreased spasticity ($p<0.001$)

Zhang et al. Stroke. 2015.

Acupuncture: PS Dysphagia

- M: Prospective cohort
- P: n=105 post-stroke with dysphagia
- I: Full body acupuncture + standard swallowing training
- C: standard swallowing training
- O:
  - Videofluoroscopic study (VFSS)
    - Improved compared standard care (p=0.007)
  - Standard Swallowing Assessment (SSA)
    - Improved compared standard care (p<0.0001)
  - Royal Brisbane Hospital Outcome Measure for Swallowing (RBHOMS)
    - Not significant different (p=0.71)

Mao et al. Chin J Integr Med. 2015.

Acupuncture: PS Depression

- M: Single-blind RCT
- P: n=68 with post-stroke depression
- I: Traditional full body acupuncture + placebo
- C: Fluoxetine + “minimal nontraditional acupuncture” (minimal active penetration)
- O: Hamilton Depression Scale
  - No difference between intervention vs. control
  - Acupuncture demonstrated earlier benefit and fewer AEs by Week 2

Qian et al. J. of Altern Complement Med. 2015.

Scalp Acupuncture

- M: RCT
- P: n=29 hemiplegic stroke patients
- I: Scalp acupuncture plus low frequency rTMS (repetitive transcranial magnetic stimulation)
- C: low frequency rTMS
- O:
- Fugl-Meyer motor function score
  - Improved in both groups, with significantly greater increase in scalp acupuncture group ($p<0.05$)
- Diffusion tensor imaging-measured white matter lesions
  - "Before and after treatment, there were no significant differences in the changes of fractional anisotropy values between the two groups, but the changes of the mean diffusion values in the experimental group were much greater than those in the control group in the left superior longitudinal fasciculus and the left uncinate fasciculus ($p<0.05$). Moreover, the increased fractional anisotropy values in the forceps minor in the experimental group were significantly positively correlated with the increased Fugl-Meyer assessment score."

Zhao et al. J Integr Neurosci. 2018.

Acupuncture Summary

- Small-moderate sized RCTs support acupuncture for post-stroke improvements in:
  - Cognitive function
  - Swallowing
  - Depression
  - Possibly lower extremity motor function, balance and spasticity
- Few trials demonstrated AEs, with all AEs reported at mild

Tai Chi

- Tai chi [is a] centuries-old, related mind and body practice. [It] involve[s] certain postures and gentle movements with mental focus, breathing, and relaxation.

Source: National Center for Complementary and Integrative Health. https://nccih.nih.gov/health/taichi. Accessed 9/16/19

Tai Chi

- M: Single-blind RCT
- P: n=47 community-dwelling stroke survivors
- I: Tai chi 1 hour 2 x per week
- C: Conventional exercise or no treatment
- O: Dual task performance measured as Auditory Stroop test, Turning while walking and Dual tasking condition
  - Equivalent results to conventional exercise

Chan et al. Clin Rehab. 2018.

Tai Chi

- M: RCT
- P: n=22 inpatient stroke survivors
- I: PT + Tai chi 1 hr/session 2 x per week for 6 weeks
- C: PT alone
- O: balance, gait and QOL
  - Sway length: Improved in both groups
  - Sway velocity: Improved in both groups
  - Functional reach test: Improved in Tai chi group
  - Dynamic gait index: Improved in Tai chi group
  - 10m walk test: Improved in Tai chi group
  - Get-up-and-go: Improved in Tai chi group
  - SF-36: 5 domains (physical function, pain, vitality, general health and mental health) improved in Tai chi group

Kim et al. Int J Rehabil Research. 2015.

Tai Chi: Balance and Gait

- Systematic review of 4 RCTs
- 3 of 4 RCTs demonstrated benefit of Tai chi on balance
- 3 RCTs demonstrated no benefit on mobility

Ding et al. Am J Phys Med Rehabil. 2012.

Tai Chi: Balance and Gait

- Systematic review and meta-analysis
- 5 RCTs with total n=346
- Tai chi group exhibited a significantly better gait ability than the control group on the Short Physical Performance Battery (SPPB)
  - -0.26 [-0.50 to -0.03], p = 0.027
- No significant difference in dynamic standing balance scores was found between tai chi and control groups
  - 0.154 [-0.269 to 0.578], p = 0.475

Li et al. J Rehabil Med. 2018.

Tai Chi Summary

- Systematic reviews and small RCTs support Tai Chi for post-stroke improvements in:
  - Gait
  - Quality of life domains (physical function, pain, vitality, general and mental health)
  - Dual-task performance
- Results on *balance* are mixed
- Minimal to no AEs were evident in clinical trials
- The intervention is well tolerated with multiple perceived qualitative benefits

Integrative TCM

- M: Multi-center, single-blind RCT
- P: n=360 with subacute stroke
- I: Acupuncture + Chinese herbal medicine x 8 weeks
- C: Conventional rehabilitation
- O: Significant improvements in all primary and secondary outcomes assessed at 20 week follow-up
  - Primary: National Institutes of Health Stroke Scale
  - Secondary:
    - Fugl-Meyer Assessment
    - MMSE
    - MoCA
    - HAMD
    - Self-rating Depression Scale

Fang et al. Science Reports. 2016.

Table 3

Value Changes from Baseline (week 20-week 0) of Variables Compared by Independent Samples *t*-test (PPS).

Variable	Group (N)	Week 20-week 0 Mean(SD)	95% CI of the Difference	*T*	*P*
MBI	IMR (176)	36.25 (13.05)	5.86, 11.41	6.12	<0.001
	CR (172)	27.61 (13.72)			
NIHSS	IMR (176)	−6.37 (2.66)	−1.99, −0.87	−4.99	<0.001
	CR (172)	−4.94 (2.76)			
FMA	IMR (176)	33.58 (13.67)	6.36, 11.89	6.49	<0.001
	CR (172)	24.45 (13.01)			
MMSE	IMR (62)	5.40 (3.23)	0.41, 2.37	2.81	0.006
	CR (69)	4.01 (2.64)			
MOCA	IMR (62)	5.32 (1.91)	0.86, 2.16	4.57	<0.001
	CR (69)	3.81 (1.87)			
HAMD	IMR (76)	−7.20 (3.08)	−3.03, −0.61	−2.98	0.003
	CR (77)	−5.38 (4.37)			
SDS	IMR (76)	−16.31 (9.30)	−8.67, −2.91	−3.97	<0.001
	CR (77)	−10.34 (8.73)			

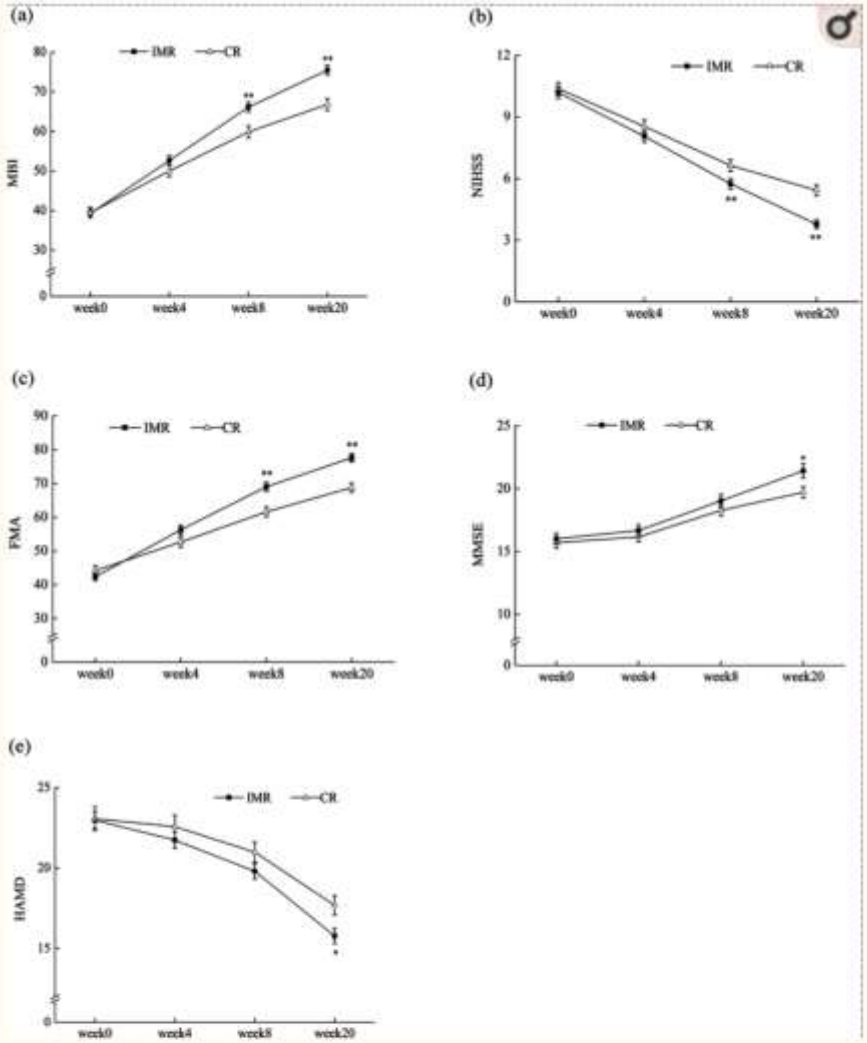


Figure 2

Means of MBI, NIHSS, FMA, MMSE, HAMD at Four Testing Time points.

(a) MBI score for the IMR and CR at four testing time points (mean ± SEM; IMR n = 176, CR n = 172). $^{**}P < 0.01$, compared to CR group. (b) NIHSS score for the IMR and CR at four time points (mean ± SEM; IMR n = 176, CR n = 172). $^{**}P < 0.01$, compared to CR group. (c) FMA score for the IMR and CR at four testing time points (mean ± SEM; IMR n = 176, CR n = 172). $^{**}P < 0.01$, compared to CR group. (d) MMSE score for the IMR and CR at four testing time points (mean ± SEM; IMR n = 62, CR n = 69). $^{*}P < 0.05$, compared to CR group. (e) HAMD score means for the IMR and CR at four testing time points (mean ± SEM; IMR n = 76, CR n = 77). $^{*}P < 0.05$, compared to CR group.

Fang et al. Science Reports. 2016.

Yoga

- M: RCT
- P: n=22 with post-stroke hemiparesis
- I: Yoga asana
- C: Usual care
- O:
  - Balance: No change
  - Mobility: No change
  - Quality of life: Memory +improved (p=0.022)
  - Quality of life: Perceived motor function +improved (p=0.0001)

Immink et al. Top Stroke Rehabil. 2014.

Yoga

- M: RCT
- P: n=47 with post-stroke
- I: Yoga asana 2x/week x 8 weeks
- C: Wait list control
- O:
  - Pain: +improved $p<0.001$
  - Neck ROM: +improved $p<0.001$
  - Hip ROM: +improved, $p<0.001$
  - Upper and lower extremity strength: +improved, $p<0.001$
  - 6 min step test: +improved, $p<0.001$

Schmid et al. Complement Ther Med. 2014.

Yoga

- M: RCT
- P: n=47 with post-stroke
- I: Group yoga asana 2x/week x 8 weeks
- C: Wait list control
- O:
  - Balance (Berg Balance Scale):
    - 41 +/- 12 vs. 46 +/- 9, $p<0.001$
  - Fear of Falling:
    - 51% vs. 46%, $p<0.001$

Schmid et al. Stroke. 2012.

Herbal Medicine

Astragalus

- M: DBPCRCT
- P: n=64 with post-stroke fatigue
- I: *Atragalus membranaceus* 2.8 grams TID x 28 days
- C: Placebo
- O: QOL and Brief Fatigue Index (BFI)
  - Improved energy (p=0.01); ~double the improvement in the intervention group
  - Improved cognitive function domain (p=0.02)
  - Improved social functioning domain (p=0.01)
  - Improved global QOL (p=0.003)

Liu et al. J. Ethnopharmacology. 2016.

Ginkgo

- M: DBPCRCT
- P: n=102 with acute ischemic stroke
- I: Ginkgo biloba
- C: Placebo
- O: NIHSS
  - 50% reduction achieved in 58.6% vs. 18.5% of GB and placebo groups respectively ($p<0.05$)

Oskkouei et al. J. Stroke Cerebrovasc Dis. 2013.

Di-Huang-Yin-Zi

- M: DBPCRCT
- P: n=100 with ischemic stroke in <100 days
- I: DHYZ x 12 weeks
- C: Placebo
- O: Improved at 8 and 12 weeks in DHYZ vs. placebo:
  - Fugl-Meyer Assessment & Barthel Index:
  - FMA grade improved at 12 weeks: 44.4% vs. 23.8% ($p<0.05$)

Yu et al. Complement Ther Med. 2015.

Other CIH Interventions

- Tui na
- Relaxation training
- Art participation

Tui Na (Chinese massage)

- M: RCT
- P: n=90 with post-stroke spasticity
- I: Tui na, 20-25 mins/limb, 5 days/week for 4 weeks
- C: “Gentle rubbing”
- O:
  - Modified Ashworth Scale (spasticity): + reduction in TN
  - Fugl-Meyer Assessment: No difference
  - Modified Barthel Index: No difference

Yang et al. Clin Rehabil. 2017.

Mindfulness-based Stress Reduction (MBSR)

- M: 12-month follow-up on a RCT
- P: n=18 post-stroke and n=11 TBI
- I: MBSR x 8 week training
- C: Usual care
- O: Improved in MBSR:
  - Self-assessed mental fatigue, $p<0.05$
  - Digit Symbol Coding and Trail-Making Test, $p<0.05$

Johansson et al. Brain Inj. 2012.

Relaxation Training

- M: 12-month follow-up on a RCT
- P: n=21 with post-stroke anxiety
- I: Self-help autogenic relaxation training CD 5x/week for 1 month
- C: Usual care
- O:
  - Reduced 12 month anxiety ($p<0.001$) measured by the Hospital Anxiety and Depression Scale-Anxiety subscale

Golding et al. Clin Rehabil. 2017.

Art Participation

- M: RCT
- P: n=81 post-stroke
- I: Art participation sessions x 8
- C: Usual care
- O: Positive and Negative Affect Scale (PNAS)
  - Suggestive of reduced negative affect

Morris et al. Disabil Rehabil. 2019.

Summary of CIH Therapies by Indication

- Gait and Balance:
  - Tai chi
  - Acupuncture?
  - Yoga
  - Di-Huang-Yin-Zi ?
- Swallowing:
  - Acupuncture
- Cognitive symptoms:
  - Acupuncture
  - *Astragalus membranaceus ?*
  - *MBSR ?*
- Mental health symptoms:
  - Acupuncture
  - Yoga
  - Relaxation training ?
- Overall QOL:
  - Tai chi
  - Yoga
  - *Astragalus membranaceus ?*
  - *Art ?*

Conclusions

- There is a significant evidence base for several CIH therapies suggesting benefits post-stroke.
- Several therapies have been systematically reviewed and/or meta-analyzed with a pooled estimate for benefit.
- The quality of research in CIH should be improved through cooperation with stroke centers and neurologists.
- The relative low cost, low risk, and potential benefit in a patient population vulnerable and desperate for even small improvements supports clinical therapeutic trials of several CIH interventions according to patient preferences.