

## Role of Yogic Intervention in the Treatment of Depression

Asha Rani<sup>1</sup>, Ravinder Kumar Verma<sup>2</sup>, Dinesh Kataria<sup>3</sup>, Bushra Zahoor<sup>4</sup>

### How to cite this article:

Asha Rani, Ravinder Kumar Verma et al. /Role of Yogic Intervention in the Treatment of Depression/Indian J of Ancient & Yoga. 2022;15(3): 83-89.

### Abstract

Depression is a psychiatric disorder, which often leads to poor quality of life and impaired role in functioning. Indeed, chances of developing a depressive illness are estimated to be 1 in 10 for men and 1 in 5 for women making it a particularly common affliction of mankind. Globally, an estimated 322 million people were affected by depression in 2015. Yoga is a set of physical, mental and spiritual practices which originated in India thousands of years ago. With evolution over it has been adapted around the world in various forms. In the last years, a new view on mental healthcare has been formed on mental healthcare, called positive psychology. This new view states, that mental health is not solely comprised of a reduction of negative symptoms, such as stress or depression, but positive experiences as well, such as emotional well-being, happiness and self-realization. Yoga, among other activities, is in line with this new view, in the sense that it practices key aspects of positive psychology. More and more research has been conducted on the effects of yoga on mental health in the last years, but little have physical, chronic conditions been the focus of this research. There is a clear need for interventions which are efficacious in improving both physical activity and depressive symptoms and multicomponent lifestyle interventions incorporating a combination of physical activity, exercise and diet. Treatment guidelines for mental disorders from leading international organisations now recommend the integration of physical activity based interventions as part of routine psychiatric care. Despite these recommendations, translation of evidence into clinical practice and routine implementation of exercise interventions as part of standard care is limited.

**Keywords:** Yoga; Depression; Anxiety; Stress.

### Introduction

Globally, mental disorders account for 32.4% of disability adjusted life years, placing mental disorders at a distant first in the global burden of disease in terms of years lived with disability.<sup>1</sup> Depressive disorders, such as major depressive disorder, affect more than 340 million people and they are the leading cause of disability worldwide<sup>2</sup>

and predicted to be the second largest contributor to the global burden of disease by the year 2020.<sup>3</sup>

Yoga is a set of physical, mental and spiritual practices which arose in India thousands of years ago. With evolution over it has been adapted around the world in various forms. Traditionally, Yoga consists of eight components as mentioned: morality (niyama), rules of conduct (yama) physical postures (asanas), withdrawal of the senses (pratyahara), concentration (dharana), breath control (*pranayama*) meditation or withdrawal of the mind (dhyana) and oneness of meditative awareness (samadhi).<sup>4</sup> Many current forms of yoga focus primarily on postures (asanas), usually with the addition of breath control (*pranayama*) and also incorporating elements of concentration or meditation at times with variation according to different styles or schools of yoga practiced in different areas of the world and for

**Author Affiliation:** <sup>1</sup>Research Scholar, <sup>2</sup>Assistant Professor, Department of yoga, Maharaja Agrasen Himalayan Garhwal University, Uttarakhand 222001, India, <sup>3</sup>Professor and Head, <sup>4</sup>Senior Resident, Department of Psychiatry, Lady Hardinge Medical College, Delhi 110001, India.

**Corresponding Author:** Bushra Zahoor, Senior Resident, Department of Psychiatry, Lady Hardinge Medical College, Delhi 110001

**E-mail:** bushra.zhr07@gmail.com

**Received on:** 17.01.2022 **Accepted on:** 19.02.2022

different purposes.<sup>5,6</sup>

Yoga has become increasingly popular outside India during the past fifty years. According to the 2017 National Health Interview Survey (NHIS) US, 14.3 % (35.2 million) of US adults used Yoga in the past 12 months.<sup>7</sup> Although reported prevalence rates vary by country as well as the reporting time frame and duration or frequency of yoga practice, reports that compare use of Yoga over time consistently find increases.<sup>8</sup>

There is a clear need for interventions which are efficacious in improving both physical activity and depressive symptoms<sup>9,10</sup> and multicomponent lifestyle interventions incorporating a combination of physical activity, exercise and diet.<sup>11,12</sup> Treatment guidelines for mental disorders from leading international organisations now recommend the integration of physical activity based interventions as part of routine psychiatric care.<sup>9,13-15</sup> Despite these recommendations, translation of evidence into clinical practice and routine implementation of exercise interventions as part of standard care is limited.<sup>16</sup>

#### *Neurobiological basis of yoga for treatment of depression*

The positive effects of Yoga on cortical GABAergic inhibitory tone and modulation of downstream brain regions has been suggested by various levels of evidence<sup>17,18</sup> along with enhancement of dopamine ventral striatum in people practicing yoga.<sup>19,20,21</sup> Yoga could also cause a rise in Serotonin levels, as suggested by several investigations performed on people after their meditation sessions showing an elevation of the serotonin metabolite levels in urine.<sup>19,22</sup> Moreover, yoga practice on a regular basis may cause a decrease in norepinephrine values, as was observed in patients with heart failure where weekly yoga was associated with lower levels of norepinephrine in blood samples.<sup>21,23</sup> Yoga practices regulate electroencephalogram (EEG) signals through switching off non-relevant neural circuits for the preservation of focused attention and blockade of inappropriate signals.<sup>24</sup> Research studying the effects of yoga on brain waves also reveal increased overall brain activity through breathing, meditation, and posture based yoga practice<sup>25</sup> particularly in the amygdala and the frontal cortex. Similar Investigations on brain waves also concluded that meditation leads to enhancement of alpha wave activity and alterations in anterior cingulate and dorsolateral prefrontal cortices.<sup>26</sup> Beta brain waves are normally dominant during wakefulness with open eyes and could be affected by stressful conditions.<sup>27,28</sup> An

enhancement of EEG beta wave activity has also been observed after yoga meditation practices.<sup>29</sup> Higher theta wave activities on EEG is associated with lower levels of anxiety.<sup>26,30</sup> An increase in theta wave activity has been seen during the practice of meditation.<sup>21,26</sup> Longer duration of meditation is associated with higher activities of theta waves and alpha waves.<sup>24,26</sup>

Yoga intervention seems to be associated with brain structural alterations, particularly in the frontal cortex, amygdala, hippocampus, insula, and anterior cingulate cortex.<sup>31</sup> A magnetic resonance imaging study revealed greater volume of gray matter in the left hippocampus in skilled yoga practitioners with at least 3 years of experience compared to the sex and age matched control subjects.<sup>32</sup>

#### *Effectiveness of yogic interventions as a treatment for depression*

Over the past few decades a large number of studies have been done studying the effectiveness of yoga as a adjunctive therapy in managing depressive disorders. Yoga interventions in depression have been seen as effective adjuvant therapy<sup>40,41</sup> as well as monotherapy.<sup>42</sup> A clinical trial studied the effectiveness of Shavasana (a type of yoga exercise) as a therapeutic technique to alleviate depression.<sup>25</sup> Subjects were selected to 30 sessions of Shavasana (Dead Body Pose) and 25 served as controls. Results revealed that Shavasana (Dead Body Pose) was an effective technique for alleviating depression.<sup>33</sup> Another research work showed that Depression, anxiety and stress decreased significantly in women after 12 sessions of regular Hatha yoga practice of 60-70 minutes.<sup>34</sup>

In the year 2019, a randomized controlled study was conducted involving 80 patients with major depressive disorder who were divided into two groups. The individuals in the yoga group had a significant fall in depression scores and significant fall in anxiety scores from baseline to 10th day. It has been concluded that Anxiety starts to improve with short term yoga sessions, while long term yoga therapy is likely to be beneficial in the treatment of depression.<sup>35</sup>

A thorough literature research was conducted to find out the role of yoga in managing anxiety and it had been concluded that Yoga is not only limited to be effective to mental health disorders but physical disorders as well.<sup>36</sup> Another trial concluded that Kriya yoga is a feasible adjunctive therapy in management of patients with major depressive disorder.<sup>37</sup> A research work also investigated the

effect of a 3-month integrated yoga intervention (3-IY) on depression, lipid indices, and serum thyroid-stimulating hormone (sTSH) levels among female patients with hypothyroidism and mild to moderate depression. The 3-IY was found to be useful in such patients for reducing depression, dyslipidemia, and sTSH.<sup>38</sup> R. Jenefer Jerrin and colleagues assessed the effect of Yoga and Naturopathy intervention on anxiety and depression of Covid-19 patients. This quasi experimental study was conducted on 130 Covid-19 positive patients admitted in a tertiary care hospital. Yoga and Naturopathic intervention was given for 60 min a day for two weeks. and Corona anxiety scale (CAS) and Hospital anxiety depression scale (HADS) was used to assess depression and generalized anxiety among the patients. The present study showed significant reduction of anxiety and depression level among the Covid-19 patients. These interventions can be added to the conventional care for better mental and physical wellbeing of the patients.<sup>39</sup> A narrative review done on the efficacy of yoga and mindfulness as an adjuvant treatment in severe mental illnesses including major depressive disorder (MDD) indicated that both yoga and mindfulness have significant and beneficial effects on reducing the severity of depressive symptoms.<sup>43</sup> Another clinical trial concluded that yoga practices in combination with the application of conventional antidepressants significantly improved depressive symptoms and reduced the remission rate in patients with MDD compared to control patients. The present study demonstrated that Sahaj Yoga has got a potential role as a component in the management of depressive disorders.<sup>44</sup> In a clinical trial done by Alison Woolery and colleagues a significant decrease in self-reported symptoms of depression after practicing yoga had been observed in individuals aged 18-29 with mild levels of depression. These effects emerged by the middle of the yoga course and were maintained by the end. Finally, there was a trend for higher morning cortisol levels in the yoga group by the end of the yoga course, compared to controls.<sup>45</sup> A meta-analysis has shown a more significant reduction in depression by yoga compared to psychoeducation.<sup>46</sup>

A trial studied the feasibility of a group based laughter yoga intervention as an adjunct for anxiety, stress and residual symptoms in people with depression.

Laughter Yoga (LY) is a group based intervention involving simulated laughter, gentle stretching, rhythmic breathing and meditation. Fifty participants were randomised to randomised to

two groups consisting of eight sessions over four weeks, or treatment as usual (n = 27). The LY group had shown statistically significant improvements in mental health related quality of life compared to the control group. The qualitative interviews highlighted aspects of the intervention that were effective and those requiring modification.<sup>47</sup> La Rocque CL (2021) and colleagues conducted a randomized controlled 8 week trial of Bikram yoga, aerobic exercise, and waitlist for depression. Author examined changes in three stress related constructs perceived stress, rumination, and mindfulness as mediators of anti depressant effects. Fifty three women with a unipolar depressive disorder were randomly assigned to one of the three conditions. Bikram yoga showed descriptively similar efficacy to aerobic exercise and both may work, in part, by helping individuals interrupt negative thinking.<sup>48</sup> A study done by N. Janakiramaiah et al.(2000) compared the relative antidepressant efficacy of SKY in melancholia with two of the current standard treatments, electroconvulsive therapy (ECT) and imipramine (IMN). Sudarshan Kriya Yoga (SKY) is a procedure involving essentially rhythmic hyperventilation at different rates of breathing. The Efficacy as an antidepressant of SKY was demonstrated in dysthymia in a prospective, open clinical trial. Significant reduction in the total scores on Hamilton Rating Scale for Depression (HRSD) and Beck Depression Inventory (BDI) was observed on successive occasions in all three groups. After 3 weeks, the SKY group had higher scores in HRSD and BDI than the ECT group but was not much different from the IMN group. Remission (total HRSD score of seven or less) rates at the end of the trial were 93, 73 and 67% in the ECT, IMN and SKY groups, respectively.<sup>49</sup> Yoga practices in association with coherent breathing intervention have been shown to resolve suicidal ideation in patients with Major depressive disorder.<sup>50-52</sup>

Some eminent researchers conducted a randomized influence of Hatha yoga as an add on treatment in major depression on hypothalamic-pituitary adrenal axis activity" on 60 from major depressive disorder (MDD) according to DSM-IV. A 5-week treatment with Yoga or not (control group) and with either Quetiapine (300 mg/day) or Escitalopram (10 mg/day) was used. The Hamilton Depression Rating Scale (21-HAMD) was used weekly and serial. dexamethasone/corticotropin releasing hormone (DEX/CRH) tests were also performed for HPA axis function assessment. A more pronounced down regulation of the HPA axis ac detected. Yoga add-on treatment did not have any additional effect on the stepwise long

term cortisol reduction seen in both medication groups. The study concluded that HPA axis function is down regulated to a greater extent with antidepressant medications than with additional Hatha yoga treatment.<sup>53</sup>

Chen and colleagues (2009) conducted an RCT to assess the effects of six months' practice-pharmacological of yoga intervention for improving a self-perception of health status. The study was conducted in eight activity centers in southern Taiwan. A total of 139 participants were recruited from the centers, and the centers were randomly assigned (i.e., via cluster randomization) to the Silver Yoga experimental group (SYEG) or to a waitlist control group (WCG). The SYEG's depression state decreased; the WCG's mean depression rating scale scores significantly but in the opposite direction—depression worsened.<sup>54</sup> A systematic review studied yogic interventions aimed at improving depressive symptoms. A total of 23 interventions from 2011 to May 2016 were evaluated in this review. Study designs used were randomized control trials, pretest/posttest and quasi-experimental with majority being randomized control trials. Despite the limitations, it was concluded that the yoga interventions were effective in reducing depression.<sup>55</sup>

A Delphi method study was conducted on "Establishing the components of yoga interventions for reducing depression and anxiety, and improving well-being" four twenty teachers participated in where Eighteen completed the second round (n = 18). General consensus (>75% of participants in agreement) was achieved on parameters of practice (dosage): Average of 30 to 40 minutes, for 5 times per week, over a period of 6 weeks. Numerous recommendations from teachers for yoga techniques were collected in the first round. The second round helped make a consensus statement on the recommendations. Breath regulation as well as postures were considered very important for people with depression; and relaxation, breath regulation and meditation being very important or essential for people with anxiety. Other recommended components also achieved consensus. General consensus for teachers to have a minimum of 500 training hours over 2 years, at least 2 years teaching experience was made as well as training in developing personalized yoga practices, training in yoga for mental health, and professional supervision or mentoring.<sup>56</sup>

## Conclusion

This review found evidence of a positive effect

of yoga and sheds light on its use beyond usual care for improvement in depressive symptoms in people with a range of mental disorders. Yoga may be considered as an evidence based exercise modality alongside conventional forms of exercise given the positive results of this review. It may also provide an additional or alternative strategy to help people with depression engage in meaningful physical activity.

## REFERENCES

1. Vigo D, Thornicroft G, Atun R. Estimating the true global burden of mental illness. *Lancet Psychiatry* 2016;3:171-8. doi:10.1016/S2215-0366(15)00505-2 pmid:http://www.ncbi.nlm.nih.gov/pubmed/26851330.
2. Greden JF. The burden of recurrent depression: causes, consequences, and future prospects. *J Clin Psychiatry* 2001;62(Suppl 22):5-9. pmid:http://www.ncbi.nlm.nih.gov/pubmed/11599650.
3. Murray CJ, Lopez AD, World Health Organization. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary, 1996.
4. Sarbacker S, Kimple K. *The eight limbs of yoga: A handbook for living yoga philosophy* North Point Press (2015).
5. DeMichelis E. *A history of modern yoga Patanjali and western esotericism*, Continuum, London (2005).
6. Singleton M. *Yoga body The origins of modern posture practice*, Oxford University Press, Oxford (2010).
7. Clarke T, Barnes P, Black L, Stussman B, Nahin R. *Use of yoga, meditation, and chiropractors among U.S. adults aged 18 and over*. NCHS data brief, no 325, National Center for Health Statistics, Hyattsville, MD (2018) November.
8. Ding D, Stamatakis E. *Yoga practice in England 1997-2008: Prevalence, temporal trends, and correlates of participation* BMC Res Notes, 7 (2014), p. 172.
9. Stubbs B, Vancampfort D, Hallgren M, et al. EPA guidance on physical activity as a treatment for severe mental illness: a meta-review of the evidence and position statement from the European Psychiatric Association (EPA), supported by the International Organization of Physical Therapists in Mental Health (IOPTMH). *Eur Psychiatry* 2018;54:124-44. doi:10.1016/j.eurpsy.2018.07.004 pmid:30257806.

10. Firth J, Siddiqi N, Koyanagi A, et al. The Lancet psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *Lancet Psychiatry* 2019;6:675–712. doi:10.1016/S2215-0366(19)30132-4 pmid:31324560.
11. Teasdale SB, Ward PB, Rosenbaum S, et al. Solving a weighty problem: systematic review and meta-analysis of nutrition interventions in severe mental illness. *Br J Psychiatry* 2017;210:110–8. doi:10.1192/bjp.bp.115.177139 pmid: http://www.ncbi.nlm.nih.gov/pub med/27810893.
12. Schuch FB, Vancampfort D, Richards J, et al. Exercise as a treatment for depression: a meta-analysis adjusting for publication bias. *J Psychiatr Res* 2016;77:42– 51. doi:10.1016/j.jpsy chires.2016.02.023 pmid: http://www.ncbi.nlm.nih.gov/pubmed/26978184.
13. National Mental Health Commission. Equally well consensus statement: improving the physical health and wellbeing of people living with mental illness in Australia. Sydney, Australia, 2016.
14. Malhi GS, Bassett D, Boyce P, et al. Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for mood disorders. *Aust N Z J Psychiatry* 2015;49:1087–206. doi:10.1177/0004867415617657 pmid: http://www.ncbi.nlm.nih.gov/pubmed/26643054.
15. Kennedy SH, Lam RW, McIntyre RS, et al. Canadian network for mood and anxiety treatments (CANMAT) 2016 clinical guidelines for the management of adults with major depressive disorder: section 3. pharmacological treatments. *Can J Psychiatry* 2016;61:540–60. doi:10.1177/0706743716659417 pmid: http://www.ncbi.nlm.nih.gov/pubmed/27486148.
16. Schuch FB, Morres ID, Ekkekakis P, et al. Exercise works for depression: bridging the implementation gap and making exercise a core component of treatment. *Acta Neuropsychiatr* 2017;29:1246. doi:10.1017/neu.2017.1 pmid: http://www.ncbi.nlm.nih.gov/pubmed/28262.
17. Mehta UM, Gangadhar BN. Yoga: Balancing the excitation-inhibition equilibrium in psychiatric disorders. *Prog Brain Res.* 2019;244:387-413.
18. Beart PM. Yoga and GABA: New Insights from the Science. *World J Yoga.* 2020;2.
19. Newberg AB, Iversen J. The neural basis of the complex mental task of meditation: neurotransmitter and neurochemical considerations. *Med Hypotheses.* 2003;61:282-291.
20. Kjaer TW, Bertelsen C, Piccini P, Brooks D, Alving J, Lou HC. Increased dopamine tone during meditation-induced change of consciousness. *Brain Res Cogn Brain Res.* 2002;13:255-259.
21. Krishnakumar D, Hamblin MR, Lakshmanan S. Meditation and Yoga can Modulate Brain Mechanisms that affect Behavior and Anxiety-A Modern Scientific Perspective. *Anc Sci.* 2015;2:13-19.
22. Walton KG, Pugh ND, Gelderloos P, Macrae P. Stress reduction and preventing hypertension: preliminary support for a psychoneuroendocrine mechanism. *J Altern Complement Med.* 1995;1:263-283.
23. Curiati JA, Bocchi E, Freire JO, Arantes AC, Braga M, Garcia Y, Guimarães G, Fo WJ. Meditation reduces sympathetic activation and improves the quality of life in elderly patients with optimally treated heart failure: a prospective randomized study. *J Altern Complement Med.* 2005;11:465-472.
24. Aftanas L, Golosheykin S. Impact of regular meditation practice on EEG activity at rest and during evoked negative emotions. *Int J Neurosci.* 2005;115:893-909.
25. Desai R, Tailor A, Bhatt T. Effects of yoga on brain waves and structural activation: A review. *Complement Ther Clin Pract.* 2015;21:112-118.
26. Cahn BR, Polich J. Meditation states and traits: EEG, ERP, and neuroimaging studies. *Psychol Bull.* 2006;132:180-211.
27. Ajjimaporn A, Rachiwong S, Siripornpanich V. Effects of 8 weeks of modified hatha yoga training on resting-state brain activity and the p300 ERP in patients with physical disability-related stress. *J Phys Ther Sci.* 2018;30:1187-1192.
28. Teplan M. Fundamentals of EEG measurement. *Measure Sci Rev.* 2002;2:1-11.
29. Bhatia M, Kumar A, Kumar N, Pandey RM, Kochupillai V; EEG study; BAER study; P300 study. Electrophysiologic evaluation of SudarshanKriya: an EEG, BAER, P300 study. *Indian J Physiol Pharmacol.* 2003;47:157-163.
30. Inanaga K. Frontal midline theta rhythm and mental activity. *Psychiatry Clin Neurosci.* 1998;52:555-566.
31. Gothe NP, Khan I, Hayes J, Erlenbach E, Damoiseaux JS. Yoga Effects on Brain Health: A Systematic Review of the Current Literature. *Brain Plast.* 2019;5:105-122.
32. Gothe NP, Hayes JM, Temali C, Damoiseaux JS. Differences in Brain Structure and Function Among Yoga Practitioners and Controls. *Front Integr Neurosci.* 2018;12:26.
33. Khumar SS, Kaur P, Kaur S. Effectiveness of

- Shavasana on depression among university students. *Indian Journal of Clinical Psychology*. 1993 Sep.
34. Shohani M, et al. The effect of Yoga on stress, anxiety and depression in women. *International Journal of Preventive Medicine*, 2018; 9:21.
  35. Kumar S, et al. Effect of adjunct yoga therapy in depressive disorders: Findings from a randomized controlled study. *Indian J Psychiatry*, 2019; 61: 592-7.
  36. Aurelus E. Effect of Yoga on Anxiety. *Int J Chronic Dis Ther*, 2020; 6(1):95-97.
  37. Srivastava A, Kuppili PP, Gupta T, Nebhinani N, Chandani A. Kriya Yoga in Patients with Depressive Disorders: A Pilot Study. *Journal of Neurosciences in Rural Practice*. 2021 Apr;12(02):362-7.
  38. Rani S, Maharana S, Metri KG, Bhargav H, Nagaratna R. Effect of yoga on depression in hypothyroidism: A pilot study. *Journal of Traditional and Complementary Medicine*. 2021 Jan 6.
  39. Jerrin RJ, Theebika S, Panneerselvam P, Venkateswaran ST, Manavalan N, Maheshkumar K. Yoga and Naturopathy intervention for reducing Anxiety and Depression of Covid-19 patients—a pilot study. *Clinical Epidemiology and Global Health*. 2021 Jun 1:100800.
  40. Ravindran AV, Lam RW, Filteau MJ, Lespérance F, Kennedy SH, Parikh SV, Patten SB; Canadian Network for Mood and Anxiety Treatments (CANMAT). Canadian Network for Mood and Anxiety Treatments (CANMAT) Clinical guidelines for the management of major depressive disorder in adults. V. Complementary and alternative medicine treatments. *J Affect Disord*. 2009;117 Suppl 1:S54-S64.
  41. Haller H, Anheyer D, Cramer H, Dobos G. Complementary therapies for clinical depression: an overview of systematic reviews. *BMJ Open*. 2019;9:e028527.
  42. Devi NA, Varambally S, Karmani S, Christopher R, Gangadhar BN. Yoga as monotherapy for the treatment of major depression - A case series. *Asian J Psychiatr*. 2020;53:102177.
  43. Sathyanarayanan G, Vengadavaradan A, Bharadwaj B. Role of Yoga and Mindfulness in Severe Mental Illnesses: A Narrative Review. *Int J Yoga*. 2019;12:3-28.
  44. Sharma VK, Das S, Mondal S, Goswami U, Gandhi A. Effect of Sahaj Yoga on depressive disorders. *Indian J PhysiolPharmacol*. 2005;49:462-468.
  45. Woolery A, Myers H, Sternlieb B, Zeltzer L. A yoga intervention for young adults with elevated symptoms of depression. *Altern Ther Health Med*. 2004;10:60-63.
  46. Vollbehr NK, Bartels-Velthuis AA, Nauta MH, Castelein S, Steenhuis LA, Hoenders HJR, Ostafin BD. Hatha yoga for acute, chronic and/or treatment-resistant mood and anxiety disorders: A systematic review and meta-analysis. *PLoS One*. 2018;13:e0204925.
  47. Bressington D, Mui J, Yu C, Leung SF, Cheung K, Wu CST, Bollard M, Chien WT. Feasibility of a group-based laughter yoga intervention as an adjunctive treatment for residual symptoms of depression, anxiety and stress in people with depression. *J Affect Disord*. 2019;248:42-51.
  48. La Rocque CL, Mazurka R, Stuckless TJR, Pyke K, Harkness KL. Randomized controlled trial of bikram yoga and aerobic exercise for depression in women: Efficacy and stress-based mechanisms. *J Affect Disord*. 2021;280:457-466.
  49. Janakiramaiah N, Gangadhar BN, Naga Venkatesha Murthy PJ, Harish MG, Subbakrishna DK, Vedarathachar A. Antidepressant efficacy of SudarshanKriya Yoga (SKY) in melancholia: a randomized comparison with electroconvulsive therapy (ECT) and imipramine. *J Affect Disord*. 2000;57:255-259.
  50. Jorge MP, Santaella DF, Pontes IM, Shiramizu VK, Nascimento EB, Cabral A, Lemos TM, Silva RH, Ribeiro AM. Hatha Yoga practice decreases menopause symptoms and improves quality of life: A randomized controlled trial. *Complement Ther Med*. 2016;26:128-135.
  51. Serpa JG, Taylor SL, Tillisch K. Mindfulness-based stress reduction (MBSR) reduces anxiety, depression, and suicidal ideation in veterans. *Med Care*. 2014;52:S19-S24.
  52. Nourollahimoghadam E, Gorji S, Gorji A, KhaleghiGhadiri M. Therapeutic role of yoga in neuropsychological disorders. *World J Psychiatr* 2021; 11(10): 754-773 [PMID: 34733640 DOI: 10.5498/wjp.v11.i10.754].
  53. Sarubin N, Nothdurfter C, Schüle C, Lieb M, Uhr M, Born C, Zimmermann R, Bühner M, Konopka K, Rupprecht R, Baghai TC. The influence of Hatha yoga as an add-on treatment in major depression on hypothalamic-pituitary-adrenal-axis activity: A randomized trial. *Journal of psychiatric research*. Jun 1;53:76- 83.Hatha yoga and the treatment of illness March 2004 *Alternative therapies in health and medicine* 10(2):20-1.
  54. Louie L. The effectiveness of yoga for depression: a critical literature review. *Issues in Mental Health Nursing*. 2014 Apr 1;35(4):265-76.

55. Bridges L, Sharma M. The efficacy of yoga as a form of treatment for depression. *Journal of evidence-based complementary & alternative medicine*. 2017 Oct;22(4):1017-28.
56. de Manincor M, Bensoussan A, Smith C, Fahey P, Bouchier S. Establishing key components of yoga interventions for reducing depression and anxiety, and improving well-being: a Delphi method study. *BMC Complementary and Alternative Medicine*. 2015 Dec 1;15(1):85.

