The Progress of Yoga for the Treatment of Anxiety

Yi Dai[1,*,†], Jie Li[2,†]

[1] Dep Fujian Medical University, Fujian, China

[2] SOAS University of London, London, UK

* Corresponding Author Email:18409263@masu.edu.cn

[†] These authors contributed equally.

Abstract. Anxiety disorders include generalized anxiety disorder (GAD), panic disorder, phobia, social anxiety disorder (SAD), and separation anxiety disorder. So far, the etiology of anxiety disorder is complex. its pathogenesis is not clear. It's the result of the comprehensive effect of genetic and psychological factors. The emotional control loop in the brain is composed of the prefrontal lobe, amygdala, hippocampus, hypothalamus, anterior cingulate us, etc. The abnormal structure, function or connection of these areas can cause emotional control disorders and constitute the pathological structural basis of anxiety disorders. The first-line therapies are selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors. Traditional drug therapy or psychotherapy has certain side effects. As a safe and effective adjuvant therapy, yoga has attracted more and more attention. As a result, we researched the effects of yoga on brain bioelectrical activity, neurotransmitters, and synaptic plasticity in the literature. as well as articles about how yoga assists patients with a range of diseases. These findings were utilized to evaluate the role of yoga practice in anxiety disorder treatment.

Keywords: Anxiety, Yoga, Treatment Mechanism.

1. Introduction

Since the global novel coronavirus outbreak at the end of 2019, the entire world has been battling the epidemic. According to a recent study, the COVID-19 epidemic has had a negative impact on the global population's mental health. So far, 147,732 participants have participated in 103 studies. The findings revealed that anxiety was present in 27.3 percent of the general population, whereas it was present in 39.6 percent of COVID-19 patients. Women and the elderly had much higher levels of anxiety. Furthermore, Europe had the highest rate of concern, at 54.6 percent, followed by the United States (31.5 percent) and Asia (28.3%). Anxiety disorders are most common in Africa (61.8 percent of the population), followed by the United States (34.9 percent), Europe (30.7 percent), and Asia (24.5 percent) [1]. The overall prevalence of anxiety among health professionals during the COVID-19 pandemic was 24.94% [2].

Generalized disturbance, anxiety disorder, phobia, social disturbance, and separation disturbance square measure all mental disorders that entail intense dread or worry. Anxiety disorders are treated with a combination of psychological methods and medication. Many people with high levels of anxiety, on the other hand, do not seek medical guidance, preferring to self-manage rather than rely on psychological or pharmaceutical interventions [3]. Yoga, a multidimensional spiritual instrument, has become a popular technique for increasing health and well-being, which is just one of its many positive impacts. Asana (body posture), breath adjustment (breathing), and meditation are the three fundamental components of yoga. Yoga can relieve anxiety because it relaxes the body during yoga. The breathing training method of yoga is similar to the breathing training method of psychotherapy. If you master the correct methods of yoga exercise and the correct breathing training method, you can rid the body of excess carbon dioxide and other waste gases. This will provide more oxygen supply and help relax the body and mind through breathing exercises in order to relieve anxiety. Yoga can also increase endorphins in the body, which can help relieve anxiety. On the other hand, the particular mechanisms of yoga in the therapy of anxiety disorders are still largely unknown. Yoga practice is also linked to neuroplastic alterations in the insula, temporo-parietal junction, front-limbic

network, and default mode network architecture. The systems mentioned here work together to create a process of improved self-regulation.

This review aims to introduce anxiety disorders, explain the mechanisms of current studies on yoga to improve anxiety disorders, and assess the therapeutic effectiveness of yoga in patients with anxiety disorders.

2. Anxiety

2.1. Symptoms

The psychological experience and feelings of excessive worry are the core symptoms of patients with anxiety disorder. Other signs and symptoms include a feeling of impending threat, panic, or tragedy; feeling apprehensive, restless, or tight; not being able to concentrate or think of other things except the present worry; having trouble sleeping; an elevated heart rate; rapid breathing (hyperventilation), and perspiration.

2.2. The relationship between SLC6A4 and anxiety

So far, the etiology of anxiety disorders is complex. Its pathogenesis is not clear. It ‘s the result of the comprehensive effect of psychological and genetic factors. If external and self-induced reasons make patients depressed, excessively worried, or afraid, and if the effective defense mechanism cannot be used, anxiety disorders may occur. Therefore, some conditions may increase the risk of illness, including trauma, serious disease, poor health conditions, accumulation of pressure, other mental illnesses (such as depression), using or misusing drugs or alcohol, addiction to substances such as caffeine and nicotine, and also the personality of patients. including trauma, serious disease, and poor health conditions. However, genetic variables, particularly SLC6A4, play a significant influence in the genesis of anxiety disorders.

Studies have shown that people with a family history have a higher risk of anxiety disorders than others. The SLC6A4 mutation may cause anxiety disorders. The hyperactivity of the amygdala and changes in neurotransmitters like 5-HT. When a person feels frightened or anxious, the amygdala deep in the central brain is active. On chromosome 17, the SLC6A4 gene is found. It is made up of 14 exons spanning approximately 35 kb and mainly encodes the transporter protein (5-HT transporter, 5-HTT) of serotonin (5-HT, serotonin). Serotonin transporters regulate 5-hydroxytryptamineergic transmission within the central system nervous by transferring serotonin molecules from the colligation house back to the presynaptic cell for utilize. It controls the access of 5-hydroxytryptamine to alternative receptors within the serotonergic system, as well as terminates and recycles serotonin in a sodium-dependent way.

The neutral amino acid transmitter transports L-tryptophan into the brain, competing with other amino acids such as phenylalanine, leucine, and methionine. The first and most time-consuming step in 5-HT production is tryptophan hydroxylase. This enzyme is found only in serotoninergic neurons in the brain. It allows tryptophan to be converted to 5-hydroxytryptophan, which is then decarbonized into 5-hydroxytryptamine (serotonin) by aromatic L-amino acid decarboxylase [4]. One part of 5-HT passes through the MAO on mitochondria, and the oxidative deamination group forms 5 hydroxindoacetaldehyde (5-HIAA), which forms 5 hydroxindoacetic acid (5HILL) after the action of aldehyde dehydrogenase, and the other part is used for the recycling of synaptic vesicles. The 5-HT must act through the mediation of the corresponding receptors. The 5-HT receptors are complex, and seven 5-HT receptor subtypes have been identified. Among these, only 5-HT3 receptors were coupled to ligand-gated channel ion channels, while the remaining six were coupled to G proteins. Their structures consist of seven transmembrane segments, three cytoplasmic rings, and three extracellular loops. The schematic of SLC6A4 5-HTTPR is shown in Figure 1.

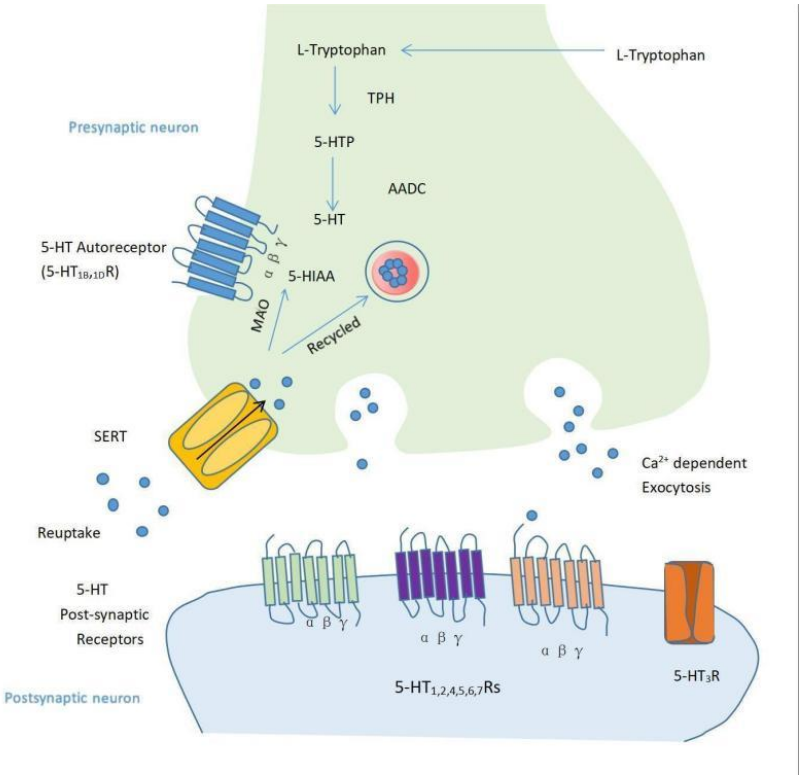

Figure 1. The Schematic of SLC6A4 5-HTTPR [5].

5-hydroxytryptamine (5-HT) is selectively transported into nerve cells via the serotonin transporter (SERT). SLC6A4 is the only gene that codes for the serotonin transporter 5-HTT. SLC6A4 polymorphisms have been linked to a number of neurological and psychiatric problems, including an increased risk of posttraumatic stress disorder, depression, obsessive-compulsive disorder (OCD), increased aggressiveness, and criminal behavior [6]. GABA is one of the underlying factors and may also be related to hyperfunction of the norepinephrine system and serotonin system abnormalities. The emotional control loop in the brain is composed of the prefrontal lobe, amygdala, hippocampus, hypothalamus, anterior cingulate rus, etc. The abnormal structure, function, or connection of these areas can cause emotional control disorders and constitute the pathological structural basis of anxiety disorders.

2.3. Treatment

Anxiety disorders (generalized mental disturbance, anxiety disorder, phobic disorder, social mental disturbance, and others) are the most common mental disorders, with a major illness burden. Anxiety disorders are often misdiagnosed and treated in basic care settings. Treatment is required when patients show significant distress or suffer from complications caused by the disease. The most common treatments include pharmacotherapy and psychotherapy. Exercise, meditation, Tai Chi, Qigong, and yoga are among the non-pharmacological and unorthodox therapies used by many people suffering from clinical anxiety or depression. The potential usefulness of these therapies for treating anxiety and depression, particularly in mild-to-moderate conditions, has piqued scientific attention. These therapies are appealing because they appear to have few major side effects and are easily accessible [7].

2.3.1. Pharmacotherapy

Pharmacotherapy, psychological treatment, or a combination of the two should be used to treat anxiety disorders. Selected serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) are first-line medications (SNRIs). In general, these antidepressants take 2 to 4 weeks to start working as an anxiolytic (in some cases, up to 6 weeks). Harmful effects may be more severe during the first two weeks. Because several SSRIs and SNRIs are cytochrome P450

enzyme inhibitors, they may interfere with other neuropsychiatric and medical illness medications. A withdrawal response may occur after the cessation of SSRI treatment [8].

Pregabalin, tricyclic antidepressants, buspirone, benzodiazepines, and other treatments are available. These medicines can help with anxiety disorder symptoms to some degree, which is beneficial for treatment, but they can have adverse effects. Patients with drug addiction and withdrawal syndromes may be at risk of misusing pregabalin following rapid discontinuation [9]. Tricyclic antidepressants, whose cardiovascular toxicity manifests as ECG problems, arrhythmias, and hypotension, are still a major cause of fatal drug overdoses. In patients, TCAs should be administered with caution who are suicidal, as they can be fatally toxic after an overdose [10]. Buspirone has been demonstrated to be useful in treating GAD in several controlled studies. However, not all studies have demonstrated superiority over placebo and/or equivalent to current medications [8]. Benzodiazepines should not be used on a regular basis. Treatment with benzodiazepines could cause central system (CNS) repressive activity, which might result in fatigue, dizziness, prolonged latency, reduced driving skills, and alternative facet effects. Chronic treatment with benzodiazepines (e.g., over four to eight months), especially in patients prone to substance abuse [11], In a case cohort study of US veterans using opioid analgesics, the authors investigated the link between benzodiazepine prescription characteristics (including dosage, kind, and dosing schedule) as well as the risk of drug overdose fatality among US servicemen who use opioid pain relievers. Benzodiazepines were prescribed to 27% of veterans who acquired opioid analgesics. According to the findings, veterans who were using both benzodiazepines and opioids were about half as likely to die from a drug overdose. With an increased prescription history for benzodiazepines, the chance of death from drug overdose rises. This shows that benzodiazepines are associated with a higher chance of mortality from dose-responsive medication overdose in veterans taking opioid analgesics [12].

2.3.2. The relationship between SLC6A4 and anxiety

Psychotherapy refers to doctors establishing a positive doctor-patient connection through verbal or nonverbal communication. Psychologists use their expertise in psychology and medicine to advise and assist patients in changing their behavior patterns and cognitive coping mechanisms. Medication is curative, whereas therapy is palliative. As a result, they are both necessary. CBT (cognitive behavioral therapy) is considered to be the most evidence-based treatment. It is well acknowledged that individuals who receive medication relapse shortly after stopping the prescription, and that the advantages of psychotherapy last for years or decades after the treatment has ended. However, considerable relapse rates were discovered several years following CBT treatment in naturalistic studies involving follow-up of individuals with anxiety disorders. Between 1985 and 2001, R.C. Durham and his team conducted eight randomized controlled clinical studies of CBT anxiety and two randomized controlled clinical trials of CBT for schizophrenia to establish long-term effects for patients with anxiety disorders and psychiatric cognitive behavioral therapy (CBT) clinical trials. 48 percent of patients were still experiencing symptoms after 2 to 14 years of follow-up. Longer time periods diminished the favorable effects of CBT identified in the original experiments. Psychotherapeutic services must realize that anxiety problems often have a long-term course, and that strong short-term results from CBT do not ensure good long-term results. Clinicians who use more than ten standard therapy options in a six-month period are unlikely to achieve better outcomes [13].

2.3.3. Adjunctive therapy

Anxiety disorders have a detrimental effect on one's wellbeing and can cause significant injury. In addition to pharmacotherapy and psychological therapy, which all have adverse reactions to some extent, more and more researchers are recognizing the role of adjunctive therapies, such as music therapy, exercise therapy, etc. Among them, as an adjunctive therapy, yoga facilitates treatment of anxiety disorders, particularly panic disorders [14]. Yoga has a calming effect on the mind and lowers anxiety levels. Although people with anxiety disorders may resist physical exercise, patients respond well to aerobic exercise, anti-group training, and yoga. Prescription safety and practical application

should be regarded as an important treatment for anxious patients. Yoga can help people with anxiety prevent injury, improve their health, and reduce anxiety.

3. The Mechanism of Yoga in anxiety

Yoga, as a safe and effective auxiliary treatment for anxiety disorder, has been widely used. At present, the main treatment methods include Hatha yoga, Kundalini yoga, Sudarshan kriya yoga, meditation, yoga asanas, chanting, breathing exercise, mind sound resonance technique, and mindfulness meditation [15]. Most of these methods combine asana, breathing and asana. Here, the mechanism of yoga as adjuvant therapy for anxiety disorders will be explained from these three aspects.

3.1. Yoga asana (posture)

There hasn't been much research done on the probable underlying mechanisms of yoga asana's effects. Yoga therapies diminish the sympathetic response to stressful emotional stimuli by regulating the activity of many brain regions crucial for emotion regulation, such as the superior parietal lobule and supramarginal gyrus. According to functional magnetic resonance imaging [16]. Yoga asana appears to trigger pressure receptors beneath the skin, resulting in increased vagal activity and lower cortisol levels. Reduced anxiety and stress would be expected to accompany these physiological and biochemical changes [17].

3.2. Yoga breathing exercise

Yogic breathing is a unique strategy for affecting psychologic and stress-related diseases by harmonizing the autonomic nerve system. There are many different kinds of breathing methods, such as Nadi sodhana (alternate nostril breathing), Ujjayi Pranayama (mimic the sound of ocean waves), Kapalabhati Pranayama (open your mouth and begin to pant like a dog, Focus on the exhalation), Bhramari Pranayama (deep breath in, exhale with a chant of "OM"). By consciously changing breathing patterns, it is possible to alter autonomic nervous system functions such as heart rate variability and cardiac vagal tone. Sudarshan Kriya (SK) means "proper vision, purified action," and pranayama is a Sanskrit term that means "breath control," such as inhale for 5–10 seconds, hold the inhaled breath for another 4–10 seconds, expel for 6–12 seconds, then hold the exhaled breath for several seconds. The clinical, nutritional and psychological data of 37 subjects were recorded in 2 months. The data in figure2 shows that the anxiety and stress index of the subjects decreased and the patience index increased during the practice.

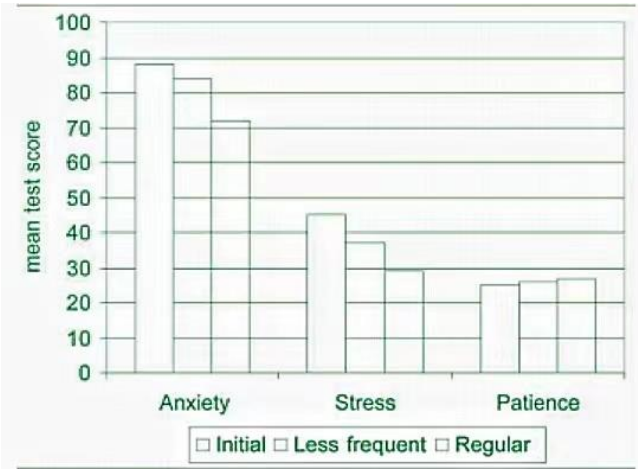

Figure 2. Regular practice of Sudarshan Kriya Yoga (SKY) has an effect on anxiety, patience, and stress levels. Initial = O; Less frequent = only a weekly large session and a short session at least once each week [18].

3.3. Meditation

The five types of waves that make up brainwave signals are called Delta, Theta, Alpha, Beta, and Gamma. Each brain wave has a certain frequency range within which it operates. Higher mental activity, such as perception, problem solving, and consciousness, is frequently connected with gamma waves. More than 40Hz is the frequency range. Active, busy thinking, active processing, active focus, arousal, and cognition are all linked to beta waves. The range of frequencies is 13Hz to 39Hz. Alpha waves, which have frequencies ranging from 7 to 13 Hz, are frequently associated with a calm, relaxed, but aware condition. Apart from rapid eye movement sleep, which occurs at a frequency of 4Hz to 7Hz, theta waves occur most often when a person is in profound meditation or relaxation. Finally, when a person is in deep dreamless sleep and loses awareness of their body, delta waves smaller than 4Hz occur. Meditation causes changes in the anterior cingulate and dorsolateral prefrontal cortices, as well as an increase in Alpha wave activity, according to studies on brain waves in meditators [19].

Some researchers recorded the brain waves of the subjects during meditation, as shown in figure 3 When compared to the other waves, the Alpha wave has the highest EEG signal value and is unaffected by gender. When the brain produces alpha waves, it can help the person enter a state of relaxation, and reduce the symptoms of anxiety.

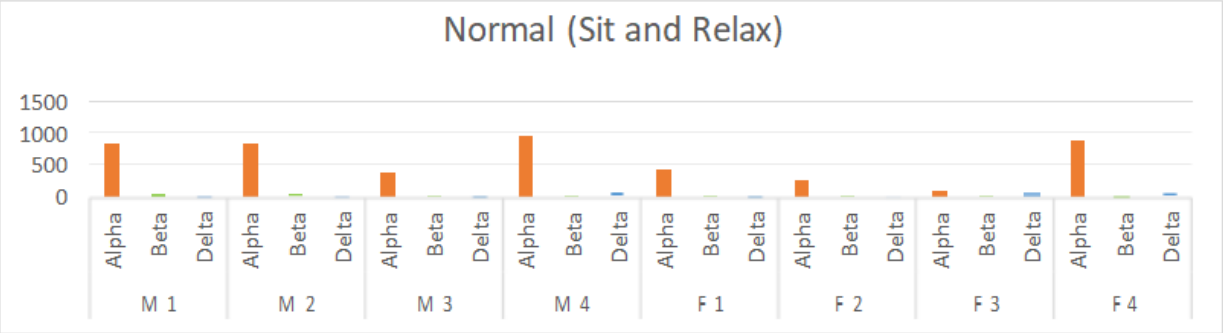

Figure 3. The histogram of the EEG signal reading for the subjects' first physiological activity [20].

4. The therapeutic effect of yoga on anxiety disorders

Yoga practice can effectively improve patients' anxiety and improve their clinical effects. Yoga can not only be used as exercise and relaxation, but can also be used as an adjunctive therapy in clinical treatment to treat mental illness. In the therapy of anxiety disorders, this effect is particularly noticeable. In recent years, yoga has been employed as an adjuvant treatment for mental disease, particularly anxiety disorders. To obtain the optimum benefit, medical yoga incorporates suitable breathing methods, mindfulness, meditation, and consciousness learning [21].

4.1. Body changes

Yoga has been proven in various studies to possess helpful impacts on the body in an exceedingly wide variety of ways, including trying to assist in managing glucose levels, relieving contractor diseases, and maintaining a healthy circulatory system. Yoga has additionally been proven to supply vital psychological benefits, like increasing motivation and happy feelings while reducing bad feelings of anger, despair, and anxious moods. When patients feel scared or anxious, the sympathetic nervous system, often known as the "emergency response system," is engaged. Vasoconstriction and reduced blood flow to the extremities, limbs, and digestive tract can occur as a result of this response. The liver breaks down animal starch into aldohexose and releases aldohexose into the blood. As a result, blood sugar levels rise. On the other hand, yoga on the parasympathetic nervous system can help to restore autonomic nervous system balance by stimulating the parasympathetic system. That reduces the rate of force per unit area.

4.2. Clinical effect

According to a study published in JAMA Psychiatry recently, Kundalini yoga is useful in alleviating the symptoms of generalized anxiety disorder. Naomi M. Simon et al. undertook a randomized, three-arm, regulated, single-blind (masked self-governing raters) medical trial between 2013 and 2019 to see if yoga (Kundalini Yoga) and cognitive behavioral therapy (CBT) are more effective than the control condition in treating GAD (strain education). Two hundred and twenty-six persons with GAD were randomly allocated to one of three groups: Kundalini Yoga, CBT for GAD, or strain education. The Kundalini yoga group had a higher response rate (54.2%) than the strain education group, according to the findings (33.0 percent). However, Kundalini yoga was not found to be as beneficial as CBT in the non-inferiority test. It indicates yoga was effective in improving GAD symptoms, but it was worse than cognitive behavioral therapy [22].

In 2018, Katrin Hardoerfer and Elisabeth Jentschke launched a clinical investigation into the impact of yoga therapy on cancer patients' anxiety symptoms. A total of 70 people took part in the research. In a randomized controlled experiment on cancer patients with various diagnoses, they compared yoga therapy to a wait-list control group. Anxiety symptoms were measured using the General Anxiety Disorder (GAD-7) scale. A yoga treatment is given once a week for 60 minutes for a total of eight weeks. Restrained physical and respiratory activities, as well as meditation, are part of the curriculum. On the waiting list, the control group did not get any yoga treatment. When compared with the control group, the results demonstrated that yoga treatment dramatically reduced anxiety in the intervention group. This shows that yoga treatment can help cancer patients with anxiety symptoms [23].

In four community rehabilitation centers in Hong Kong, researchers evaluated the impacts of a mindfulness yoga session with stretching and resistance training exercise (SRTE) on mental trauma, physical health, psychic well-being, and health-related quality of life (HRQOL) in patients with mild-to-moderate PD. A total of 187 people (18 years old) with idiopathic PD were included in the study. They were able to stand independently by convenience sampling with or without an assistive device. Participants were allocated to either mindfulness yoga or a stretching and resistance training activity at random (SRTE). The results revealed that the yoga group improved much more than the SRTE group, particularly in terms of anxiety. Mindfulness yoga training is just as efficacious in treating motor disorders as SRTE and activity in mild to moderate PD patients, and it also has the added advantages of reducing anxiety and depressive symptoms, as well as enhancing mental health and HRQOL [24].

Lei Yi conducted a randomized regulated experiment on the effects of yoga on women with post-traumatic stress disorder symptoms in 2022. The participants in this study were randomly allocated to either a control or a yoga group. Over the course of 12 weeks, participants attended six 45-minute yoga sessions. The level of psychological anguish is assessed using the Depression and Anxiety Stress Scale (DASS) and the Event Impact Scale Revision (IES-R). According to the findings, the total IES-R score in the yoga group was considerably lower than in the matched group. The yoga group's total DASS-21 score was considerably lower than the matched groups. After the interference and follow-up, the yoga group had decreased levels of anxiety and depression. After intervention, the yoga group had lower invasion and avoidance than the control group. The findings imply that a yoga intervention can reduce anxiety and despair in women with PTSD following a motor vehicle accident, as well as ameliorate PTSD symptoms [25].

5. Conclusions

Anxiety disorder is a very common disease in today's society, and traditional drug therapy has certain side effects. Yoga can significantly improve anxiety symptoms by practicing asana, breathing and meditation. As an auxiliary therapy, yoga has a positive impact on anxiety disorder, and it is a safe and effective way. However, yoga has various contents and forms. In the future, we should focus

on designing a systematic and reproducible yoga auxiliary therapy, which is based on the exploration of the causes of anxiety disorder and the in-depth understanding of the mechanism of yoga in anxiety.

References

[1] Pashazadeh Kan, F., Raoofi, S., Rafiei, S., Khani, S., Hosseinifard, H., Tajik, F., Raoofi, N., Ahmadi, S., Aghalou, S., Torabi, F., Dehnad, A., Rezaei, S., Hosseinipalangi, Z., & Ghashghaee, A. (2021). A systematic review of the prevalence of anxiety among the general population during the COVID-19 pandemic. Journal of affective disorders, 293, 391–398.

[2] Sahebi, A., Nejati-Zarnaqi, B., Moayedi, S., Yousefi, K., Torres, M., & Golitaleb, M. (2021). The prevalence of anxiety and depression among healthcare workers during the COVID-19 pandemic: An umbrella review of meta-analyses. Progress in neuro-psychopharmacology & biological psychiatry, 107, 110247.

[3] Cramer, H., Lauche, R., Anheyer, D., Pilkington, K., de Manincor, M., Dobos, G., & Ward, L. (2018). Yoga for anxiety: A systematic review and meta-analysis of randomized controlled trials. Depression and anxiety, 35(9), 830–843.

[4] Pytliak, M., Vargová, V., Mechírová, V., & Felšöci, M. (2011). Serotonin receptors - from molecular biology to clinical applications. Physiological research, 60(1), 15–25.

[5] Canli, T., & Lesch, K. P. (2007). Long story short: the serotonin transporter in emotion regulation and social cognition. Nature neuroscience, 10(9), 1103–1109.

[6] Hande, S. H., Krishna, S. M., Sahote, K. K., Dev, N., Erl, T. P., Ramakrishna, K., Ravidhran, R., & Das, R. (2021). Population genetic variation of SLC6A4 gene, associated with neurophysiological development. Journal of genetics, 100, 16.

[7] Saeed, S. A., Antonacci, D. J., & Bloch, R. M. (2010). Exercise, yoga, and meditation for depressive and anxiety disorders. American family physician, 81(8), 981–986.

[8] Bandelow, B., Michaelis, S., & Wedekind, D. (2017). Treatment of anxiety disorders. Dialogues in clinical neuroscience, 19(2), 93–107.

[9] Baldwin, D. S., Ajel, K., Masdrakis, V. G., Nowak, M., & Rafiq, R. (2013). Pregabalin for the treatment of generalized anxiety disorder: an update. Neuropsychiatric disease and treatment, 9, 883–892.

[10] Thanacoody, H. K., & Thomas, S. H. (2005). Tricyclic antidepressant poisoning: cardiovascular toxicity. Toxicological reviews, 24(3), 205–214.

[11] Schweizer, E., Rickels, K., Case, W. G., & Greenblatt, D. J. (1990). Long-term therapeutic use of benzodiazepines. II. Effects of gradual taper. Archives of general psychiatry, 47(10), 908–915.

[12] Park, T. W., Saitz, R., Ganoczy, D., Ilgen, M. A., & Bohnert, A. S. (2015). Benzodiazepine prescribing patterns and deaths from drug overdose among US veterans receiving opioid analgesics: case-cohort study. BMJ (Clinical research ed.), 350, h2698.

[13] Durham, R. C., Chambers, J. A., Power, K. G., Sharp, D. M., Macdonald, R. R., Major, K. A., Dow, M. G., & Gumley, A. I. (2005). Long-term outcome of cognitive behaviour therapy clinical trials in central Scotland. Health technology assessment (Winchester, England), 9(42), 1–174.

[14] Saeed, S. A., Cunningham, K., & Bloch, R. M. (2019). Depression and Anxiety Disorders: Benefits of Exercise, Yoga, and Meditation. American family physician, 99(10), 620–627.

[15] Pm, A., Vk, A., Mur, A., Mp, B., Nm, C., & Sva, C., et al. (2021). Development, validation, and feasibility of a generic yoga-based intervention for generalized anxiety disorder - sciencedirect. Complementary Therapies in Medicine.

[16] Nourollahimoghadam, E., Gorji, S., Gorji, A., & Ghadiri, M. K. (2021). Therapeutic role of yoga in neuropsychological disorders. World journal of psychiatry, 11(10), 20.

[17] Winroth, D., Hassmen, P., & Stevens, C. J. (2021). Acute effects of yin yoga and aerobic exercise on anxiety. Alternative & Integrative Medicine, 8(2), 278.

[18] Agte, V. V., & Chiplonkar, S. A... (2008). Sudarshan kriya yoga for improving antioxidant status and reducing anxiety in adults. Alternative & Complementary Therapies, 14(2), 96-100.

[19] Nabilah, A., Azami, S. K., Dafhalla, A., Adibah, M., & Naimah, Y... (2021). The effect of meditation on brain relaxation incorporating different physiological activities. Journal of Physics: Conference Series, 1962(1), 012059 (10pp).

[20] Yin, J., Tang, L., & Dishman, R. K... (2021). The effects of a single session of mindful exercise on anxiety: a systematic review and meta-analysis. Mental Health and Physical Activity, 21(1), 100403.

[21] Stephens I. (2017). Medical Yoga Therapy. Children (Basel, Switzerland), 4(2), 12. https://doi.org/10.3390/children4020012

[22] Simon, N. M., Hofmann, S. G., Rosenfield, D., Hoeppner, S. S., Hoge, E. A., Bui, E., & Khalsa, S. (2021). Efficacy of Yoga vs Cognitive Behavioral Therapy vs Stress Education for the Treatment of Generalized Anxiety Disorder: A Randomized Clinical Trial. JAMA psychiatry, 78(1), 13–20.

[23] Hardoerfer, K., & Jentschke, E. (2018). Effect of Yoga Therapy on Symptoms of Anxiety in Cancer Patients. Oncology research and treatment, 41(9), 526–532.

[24] Kwok, J., Kwan, J., Auyeung, M., Mok, V., Lau, C., Choi, K. C., & Chan, H. (2019). Effects of Mindfulness Yoga vs Stretching and Resistance Training Exercises on Anxiety and Depression for People with Parkinson Disease: A Randomized Clinical Trial. JAMA neurology, 76(7), 755–763.

[25] Yi, L., Lian, Y., Ma, N., & Duan, N. (2022). A randomized controlled trial of the influence of yoga for women with symptoms of post-traumatic stress disorder. Journal of translational medicine, 20(1), 162.