Acupuncture and Herbal Medicine

# Research progress on non-pharmacological therapies of traditional medicine for depression

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**Abstract**

Depression is a prevalent neuropsychiatric disorder characterized by persistent sadness, anhedonia, guilt, fatigue, and impaired concentration. Although pharmacotherapy and psychotherapy can be effective, their utility is limited by adverse effects and significant inter-individual variability. Non-pharmacological therapies from traditional medicine have emerged as promising adjuncts owing to their favorable safety profiles, minimal side effects, and high patient compliance. These therapies, including acupoint stimulation, meditation, and yoga, produce antidepressant effects by reducing neuroinflammation, modulating neurotransmitter release, enhancing neuroplasticity, and regulating the gut-brain axis. This review summarizes clinical applications and mechanistic insights of traditional medicine's non-pharmacological therapies for depression, providing a scientific rationale for their integration into comprehensive management.

**Keywords:** Clinical applications, Depression, Non-pharmacological therapies, Research progress, Traditional medicine

## Introduction

Depression is a common neuropsychiatric disorder characterized by persistent sadness, anhedonia, guilt, fatigue, and impaired concentration[1]. Its global prevalence is rising annually, the Institute for Health Metrics and Evaluation estimates that approximately 280 million people worldwide are affected by depression[2], and it is projected to become the leading contributor to the global disease burden by 2030[3]. The World Health Organization has prioritized depression in its Mental Health Gaps Action Programme[4]. Although psychotherapy and pharmacotherapy can be effective, psychotherapy is limited by suboptimal therapeutic potency, prolonged treatment duration, elevated costs, and a shortage of trained practitioners, thus collectively posing barriers to clinical implementation[5]. Conventional pharmacotherapy is constrained by significant inter-individual differences in response, variable efficacy, and adverse effects[6–7].

Recently, non-pharmacological therapies from traditional medicine have gained attention as adjuncts for depression treatment because of their cost-effectiveness, safety, and minimal adverse effects. These therapies, including acupoint stimulation, five-element music therapy, meditation, and yoga, produce antidepressant effects by attenuating inflammatory responses, modulating neurotransmitter release, enhancing cerebral function *via* somatic regulation, unblocking meridians, harmonizing *qi* and blood, improving neuroplasticity, and influencing the gut-brain axis[8]. This review synthesizes clinical research on these traditional non-pharmacological approaches, aiming to describe their applications and mechanisms, evaluate their clinical efficacy and development in conjunction with contemporary studies, and provide a scientific foundation for their integration into comprehensive depression management.

A search of CNKI and PubMed was conducted to identify clinical trials from the past 5 years investigating non-pharmacological therapies for depression, including acupuncture, yoga, Tai Chi, transcutaneous electrical cranial-auricular stimulation, meditation, etc. Studies were selected based on predefined inclusion criteria, focusing on patients with depression and interventions involving single or integrated traditional medicine approaches. After screening, 82 eligible studies (34 Chinese and 48 English) were included, with their respective therapeutic modalities and underlying mechanisms analyzed and summarized (Table 1).

## Traditional medicine non-pharmacological therapies in treating depression

### *Acupoint stimulation therapy*

#### *Invasive acupoint stimulation therapy*

Acupuncture, the predominant invasive acupoint stimulation modality used in clinical practice, is widely

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**Table 1**

**Summary of traditional medicine non-pharmacological therapies for depression**

| Interventions | Number of related articles | Country | Diseases | Conclusion | Mechanisms |
|---|---|---|---|---|---|
| Acupoint stimulation[9–54] | 46 | China | 1) Depression<br>2) Post-stroke depression<br>3) Hemodialysis with depression<br>4) Insomnia with depression<br>5) Parkinson disease with depression | Alleviating depressive symptoms with comparable efficacy to pharmacotherapy | 1) Reducing the levels of IL-1β, TNF-α<br>2) Increasing the levels of DA, 5-HT<br>3) Promoting the expression of BDNF |
| Meditation Therapy[55–68] | 14 | India | 1) Postpartum depression<br>2) Alzheimer disease with depression<br>3) Postoperative depression after cervical cancer surgery<br>4) Post-stroke with depression<br>5) Depression | Improving depressive symptoms | 1) Increasing the levels of DA, 5-HT<br>2) Reducing the level of cortisol<br>3) Modulating brain FC |
| TCM exercises therapy[69–72] | 4 | China | 1) Depression<br>2) Type 2 diabetes with depression<br>3) Perimenopausal syndrome with depression<br>4) Chronic heart failure with depression | Relieving depressive symptoms | 1) Increasing the levels of DA, 5-HT<br>2) Reducing the level of cortisol<br>3) Regulating the levels of IL-1β, TNF-α<br>4) Improving HRV<br>5) Improving NT proBNP |
| Yoga therapy[73–76] | 4 | India | Depression | Reducing stress, anxiety, and depressive symptoms | 1) Regulating the levels of IL-1β, TNF-α<br>2) Promoting the expression of BDNF<br>3) Improving HRV |
| Tuina therapy[77–79] | 3 | China | 1) Subthreshold depression<br>2) Knee osteoarthritis with depression<br>3) Chronic low back pain with depression<br>4) Postpartum depression | Improving the automatic function and depressive symptoms | 1) Improving HRV<br>2) Promoting the expression of BDNF |
| Aromatherapy[80–82] | 3 | China | 1) Post-stroke depression<br>2) Postpartum depression<br>3) Depression after microvascular breast reconstruction | Relieving depressive symptoms | Increasing the levels of DA, 5-HT |
| Five-element music therapy[83] | 1 | China | 1) Maintenance hemodialysis with depression<br>2) Tinnitus with depression | Improving depressive symptoms | Increasing the levels of DA, 5-HT |
| Mongolian mind–body interactive psychotherapy[84] | 1 | China | Depression | Relieving depressive symptoms | 1) Modulating brain FC<br>2) Increasing the levels of DA, 5-HT |
| Mongolian medicine warming acupuncture[85] | 1 | China | Depression with insomnia | Improving depressive symptoms, insomnia, and quality of life | Reducing the levels of IL-1β, TNF-α |
| TCM Cognitive behavioral therapy[86] | 1 | China | Depression | Alleviating depressive and anxious mood in patients with mild to moderate depression, and having a significantly curative effect in early stage | Reducing the levels of IL-6 |

(Continued)

**Table1**
**(Continued)**

| Interventions | Number of related articles | Country | Diseases | Conclusion | Mechanisms |
|---|---|---|---|---|---|
| Bloodletting therapy[87] | 1 | China | Depression | Relieving depressive symptoms, with better efficacy than pharmacotherapy | Reducing the levels of IL-1β, TNF-α |
| Ayurvedic full body massage therapy[88] | 1 | India | Depression | Relieving depressive symptoms | 1) Increasing the levels of DA, 5-HT<br>2) Reducing the level of cortisol |
| Hyperthermic bath therapy[89] | 1 | Ancient Egypt | Depression | Improving depressive symptoms | Increasing the levels of DA, 5-HT |
| Enema therapy[90] | 1 | China | Depression | Improve depressive symptoms and patients' quality of life | Regulating intestinal flora |

5-HT: 5-Hydroxytryptamine; BDNF: Brain-derived neurotrophic factor; DA: Dopamine; FC: Functional connectivity; HRV: Heart rate variability; IL: Interleukin; NE: Norepinephrine; NT proBNP: N-terminal pro brain natriuretic peptide; TNF-α: Tumor necrosis factor-α; TCM: Traditional Chinese medicine.

recognized for its favorable safety profile and substantial therapeutic efficacy. Empirical evidence indicates that, compared with conventional pharmacotherapy, acupuncture provides significant antidepressant effects with fewer adverse events after 4 weeks of treatment[91]. Its therapeutic mechanisms encompass multiple physiological processes, including anti-inflammatory and antioxidant actions, enhancement of neuronal plasticity, promotion of neuroprotective effects, modulation of the hypothalamic-pituitary-adrenal (HPA) axis, and functional improvement of critical brain regions such as the hippocampus, amygdala, and prefrontal cortex (PFC)[92]. Acupuncture facilitates neurotransmitter release and activates the cyclic adenosine monophosphate-protein kinase A signaling pathway through dissociation of the α subunit from the β/γ subunits. This process supports neuronal survival and function, promotes brain-derived neurotrophic factor (BDNF) release, enhances neuroprotection, and alleviates depressive symptoms[93] (Figure 1). At the intracellular level, acupuncture upregulates the extracellular signal-regulated kinase pathway, promotes the expression of BDNF and cAMP response element-binding protein, enhances synaptic plasticity, and reduces neuronal apoptosis, creating a favorable environment for neural circuit reorganization[94]. BDNF, a key factor for neuronal survival and maintenance, has been identified as a potential target for acupuncture in depression, particularly in protecting hippocampal neurons[95]. Complementary near-infrared spectroscopy studies indicate that acupuncture may enhance brain function by modulating the limbic system–neocortical network, suggesting that it acts at both molecular and neural circuit levels to provide a multi-modal treatment approach. Clinical neuroimaging studies further demonstrate that acupuncture modulates functional integration within and between neural networks in patients with major depressive disorder, and these changes may predict treatment outcomes[96]. Beyond its BDNF-mediated effects, acupuncture exerts multi-target modulation of monoaminergic systems. It attenuates norepinephrine (NE) transporter activity, elevates NE levels in the synaptic cleft, and regulates NE receptor sensitivity, resulting in neuroprotection and relief of depressive symptoms[97]. Clinically, postpartum depression studies have reported significant symptom improvement after 8 weeks of acupuncture, accompanied by reduced interleukin (IL)-6 levels[12], suggesting combined effects of neurotransmitter regulation, neurotrophic support, and immunomodulation. In a meta-analysis and systematic review of patients with diarrhea-predominant irritable bowel syndrome with comorbid anxiety and depression, acupuncture produced greater reductions in Hamilton Depression Scale (HAMD) scores and relapse rates than oral medication, confirming its effectiveness[98]. For post-stroke depression, acupuncture is considered one of the most effective non-pharmacological therapies[99].

Traditional acupuncture alleviates depressive symptoms but lacks standardized stimulation parameters. To address this limitation, electroacupuncture (EA) has been developed as an advanced alternative. It is a derivative modality of traditional acupuncture, which modulates the release and receptor expression of neurotransmitters, including dopamine (DA), 5-hydroxytryptamine (5-HT), glutamate, and gamma-aminobutyric acid (GABA), inhibits HPA axis hyperactivity and inflammation, and restores hippocampal synaptic plasticity through the application of micro-current stimulation. Thus, this mechanism enhances the therapeutic effects on depressive symptoms. Clinical studies show that EA effectively relieves depression, insomnia, and anxiety with a favorable safety profile[17]. In patients with comorbid depression and insomnia, EA stimulation of Shenmen (HT7) and Sanyinjiao (SP6) elevates DA levels, increases cerebral cortex excitability, and activates the arousal system, contributing to symptom improvement[20]. EA also reduces depressive symptoms in patients with major depressive disorder and cognitive impairment[100], and in post-stroke depression, it decreases HAMD scores and enhances neural function[16]. Mechanisms may involve vascular endothelial growth factor signaling, regulation of tight junction proteins, and modulation of matrix metalloproteinase-9 and glial fibrillary acidic protein[101].

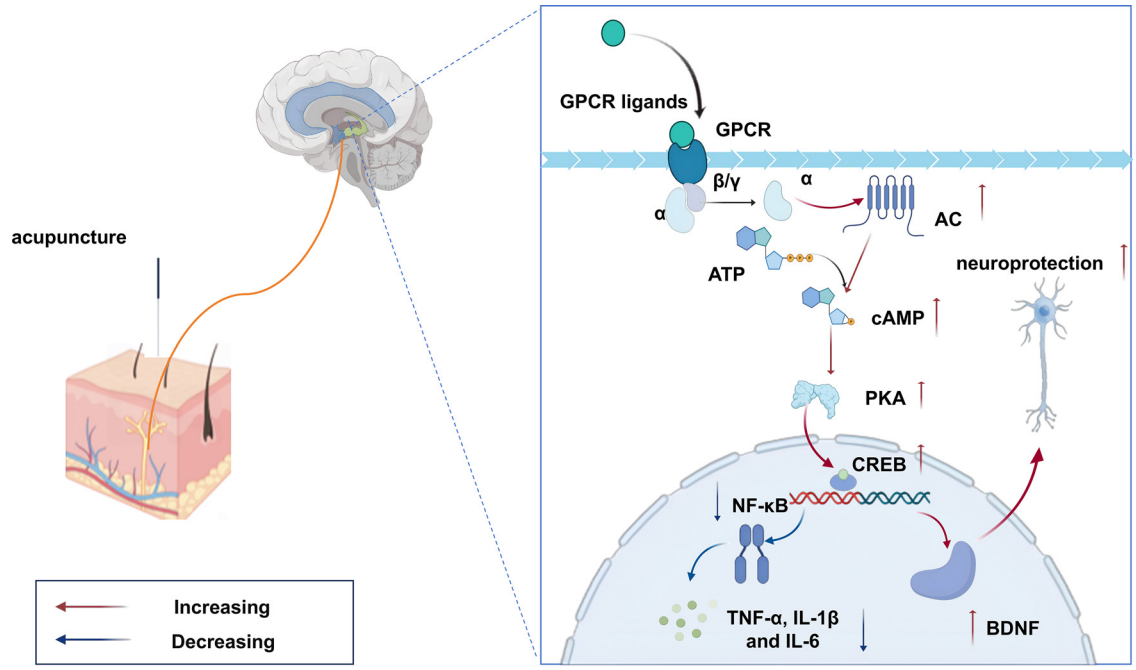


**Figure 1.** The mechanism of acupuncture in treating depression. Acupuncture regulates the prefrontal area of the brain and the hippocampus, promoting the release of neurotransmitters. By modulating the GPCR-mediated signaling pathway, acupuncture enables AC to transform ATP into cAMP, thereby activating PKA and cAMP response elements to bind CREB. Increased CREB activity can inhibit the NF-κB pathway, reduce inflammatory factors, and promote BDNF release, protect neurons, and relieve depression symptoms. AC: Adenylyl cyclase; ATP: Adenosine triphosphate; BDNF: Brain-derived neurotrophic factor; cAMP: Cyclic adenosine monophosphate; CREB: cAMP response element-binding protein; GPCR: G protein-coupled receptor; IL: Interleukin; NF-κB: Nuclear factor kappa-light-chain-enhancer of activated B cells; PFC: Prefrontal cortex; PKA: Protein kinase A; TNF-α: Tumor necrosis factor-α.

EA also improves astrocyte function by upregulating hippocampal fibroblast growth factor 2, preventing astrocyte atrophy, and mitigating depressive symptoms[102]. The antidepressant efficacy of EA depends on stimulus frequency: high-frequency EA is more effective at improving negative emotions, while low-frequency EA performs better when combined with pharmacotherapy. Some studies indicate that EA's effects are comparable to, or even exceed, pharmacotherapy[103], and its favorable safety profile makes it a viable alternative or adjunct[104].

In summary, invasive acupoint stimulation therapies, including acupuncture and EA, effectively improve depressive symptoms with robust safety profiles. Their mechanisms involve reducing inflammation, modulating neurotransmitter systems, and enhancing brain function. Future research should further elucidate these mechanisms and optimize stimulation parameters, such as frequency, intensity, and duration, to improve clinical applicability.

### *Non-invasive acupoint stimulation therapy*

Some patients with depression prefer non-invasive acupoint stimulation methods, including acupressure, acupoint patches, cupping, and moxibustion, because they wish to avoid the pain of acupuncture. Among these options, acupressure is the most widely used. Research has indicated that in older patients with depression, 4 weeks of auricular acupoint pressing and stimulation, particularly at the Ear Shenmen point ($TF_4$)[25], significantly improves depressive symptoms. These effects are believed to involve the modulation of neurotransmitter levels and the reduction of adrenocorticotropic hormone and 5-HT, which together alleviate depression[105]. Other research suggests that acupressure may stabilize the microbiome–gut-brain axis by modulating intestinal flora, ultimately improving mental health[106]. Collectively, these findings indicate that acupressure relieves depressive symptoms through neurotransmitter release and intestinal flora regulation.

With advances in electro-stimulation technology, non-invasive electrical stimulation therapies that combine traditional acupoint principles with electrodes, such as transcutaneous electrical acupoint stimulation (TEAS), have become increasingly popular. TEAS is widely favored for its non-invasiveness, safety, and ease of use. Among these, transcutaneous auricular vagus nerve stimulation (taVNS) and transcutaneous electrical cranial-auricular stimulation (TECAS) have garnered considerable attention for depression treatment and research. Studies indicate that taVNS modulates the autonomic nervous system through auricular vagus nerve stimulation, exerting antidepressant effects *via* the cholinergic anti-inflammatory pathway[107]. It activates α7 nicotinic acetylcholine receptors in both the central nervous system and peripheral tissues. Activation of the vagus nerve influences macrophages through splenic T-cell innervation, converting adrenergic to cholinergic signaling, inhibiting tumor necrosis factor-α release, and lowering plasma inflammatory factor levels. TaVNS also regulates microglia *via* central cholinergic receptors, suppressing the elevation of inflammatory factors in the PFC, hippocampus, amygdala, and other regions, thereby improving depressive states. Beyond its anti-inflammatory role, clinical studies show that taVNS

and the first-line antidepressant citalopram both normalize abnormal peripheral levels of 5-HT, DA, GABA, and NE in patients with depression, achieving comparable antidepressant effects[28]. TaVNS can also regulate the HPA axis, modulate pro-inflammatory cytokines, and adjust neurotransmitter activity[108]. Additionally, it influences brain functional connectivity (FC) in networks such as the basal ganglia, default mode, and sensorimotor networks, which may reduce depression recurrence[109] (Figure 2). Clinical studies report that 6 months of taVNS treatment in post-stroke patients leads to significant decreases in HAMD scores, improved depressive symptoms, and increased neurotransmitter levels[110]. By integrating multiple mechanisms, including cholinergic anti-inflammatory signaling, neurotransmitter normalization, HPA axis modulation, and brain FC remodeling—taVNS alleviates depressive symptoms and addresses underlying pathophysiology. It has shown positive effects in both adults and younger populations, including children and adolescents, with no significant adverse effects in clinical practice[111]. Several hospitals now recognize taVNS as a valid therapy, and expert consensus on its clinical use for depression has been established[112].

Compared with conventional taVNS, which acts mainly *via* vagus nerve branches in the concha region, TECAS represents an innovative integrative therapy. It combines TEAS at points such as Yintang (GV29) and Baihui (GV20) with taVNS[113], stimulating both trigeminal and auricular vagus nerve branches for a synergistic effect. Studies show that TECAS modulates insula-based connectivity within the default mode network (DMN), regulates the HPA axis and neurotransmitters, and significantly alleviates depressive symptoms[114]. Clinical findings confirm that TECAS achieves antidepressant effects comparable to escitalopram, though with different effects on posterior brain FC. Resting-state functional magnetic resonance imaging studies reveal that TECAS increases connectivity between the DMN and the right frontoparietal and dorsal attention networks, normalizes FC abnormalities in depressed patients[115], and offers superior safety to escitalopram. Its portability also makes it a practical option for mild-to-moderate depression[21].

Non-invasive acupoint stimulation therapies, such as taVNS and TECAS, are emerging as important interventions in depression treatment. They improve depressive symptoms through mechanisms involving HPA axis modulation, brain FC enhancement, neurotransmitter release regulation, and particularly the cholinergic anti-inflammatory pathway in the case of taVNS. Clinically, their efficacy is often comparable to pharmacotherapy, while their minimal side effects improve safety and patient compliance. Their growing acceptance suggests these therapies could become first-line non-pharmacological options in some cases. As research continues to clarify their mechanisms, the theoretical foundation for these therapies is strengthening, expanding their potential clinical applications for depression.

### *Traditional Chinese medicine exercises therapy*

Traditional Chinese medicine (TCM) exercises integrate TCM theory with mind–body practices, including Tai

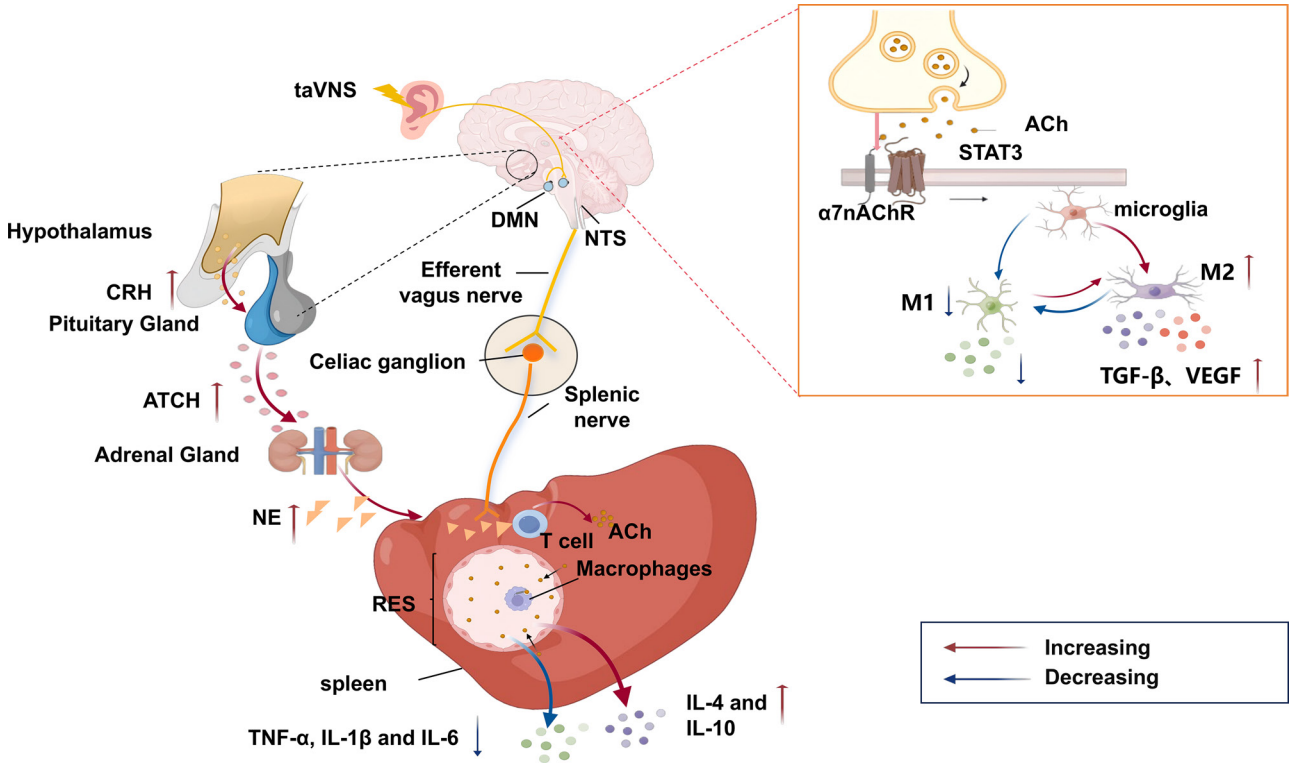


Figure 2. The mechanism of taVNS in treating depression. α7nAChR: Nicotinic acetylcholine receptor α7 subunit; ACh: Acetylcholine; ATCH: Adrenocorticotrophic hormone; CRH: Corticotropin releasing hormone; DMN: Dorsal motor nucleus; IL: Interleukin; NE: Norepinephrine; NTS: Nucleus tractus solitarius; RES: Reticuloendothelial system; STAT3: Signal transducer and activator of transcription 3; taVNS: Transcutaneous auricular vagus nerve stimulation; TNF-α: Tumor necrosis factor-α; TGF-β: Transforming growth factor β; VEGF: Vascular endothelial growth factor.

Chi, Baduanjin, and Qigong. A growing body of evidence confirms their ability to enhance physical conditioning and regulate mental health, making them effective interventions for depression[116].

Among TCM exercise therapies, Qigong and Tai Chi are the most representative mind–body approaches. Both emphasize harmony between body and mind, modulating the autonomic nervous system by balancing sympathetic and parasympathetic activity through slow, coordinated movements and rhythmic breathing. This regulation alleviates negative emotions and helps reduce depressive symptoms. Cumulative research shows that long-term practice of these interventions is especially beneficial for older patients with depression. They also reduce stress-related biomarkers, such as IL-6 and IL-1β, while mitigating chronic inflammation[117].

Neurophysiologically, TCM exercises improve mood by modulating neurotransmitter activity. Studies have shown that Tai Chi and Qigong increase DA and 5-HT levels while reducing NE, thereby stabilizing mood and enhancing emotional well-being[118]. Qigong may also suppress stress signals in the limbic system and inhibit hyperactivation of the HPA axis, further relieving depression (Figure 3). Tai Chi, in particular, has been shown to improve cognitive function, mood, and sleep quality in depressed patients, enhancing their overall quality of life[119]. A study of depression management and relapse prevention in substance dependence reported that Qigong interventions not only improve depressive symptoms but also enhance psychological resilience, reduce relapse rates, and improve quality of life[69]. These therapeutic effects are closely associated with the reduction of inflammatory responses, regulation of neurotransmitter release, and suppression of HPA axis hyperactivation. Optimizing exercise intensity, duration, and frequency enhances these benefits; for instance, older women who practiced Tai Chi for 60 minutes experienced greater improvements in depressive symptoms compared with those practicing for shorter durations[120].

TCM exercises serve not only as treatment for patients with depression but also as preventive measures to support mental health in the general population. One study involving healthy college students reported that a 12-week Tai Chi program significantly improved psychological well-being, cardiorespiratory function, and stress resilience, underscoring the value of traditional exercise modalities for psychological adjustment and health promotion[121].

In summary, TCM exercises reduce depressive symptoms by lowering stress-related biomarkers, attenuating chronic inflammation, modulating neurotransmitter levels, and curbing HPA axis hyperactivation. Their safety and absence of adverse effects make them appropriate for all age groups, establishing them as important interventions for both the treatment and prevention of depression. Future research should clarify the mechanisms of specific exercise modalities and optimize exercise regimens to maximize their clinical utility.

### *Five-element music therapy*

Five-element music therapy, rooted in TCM theory, is based on the dynamic relationships among the five elements (wood, fire, earth, metal, water) and the correspondence between the five tones (gong, shang, jue, zhi, yu) and the five zang organs (liver, heart, spleen, lung, kidney). By modulating audio frequencies and sound wave vibrations, this therapy acts on the body's organs to restore physiological balance, harmonize *yin* and *yang*, reduce stress and tension, and thereby alleviate depressive symptoms[122].

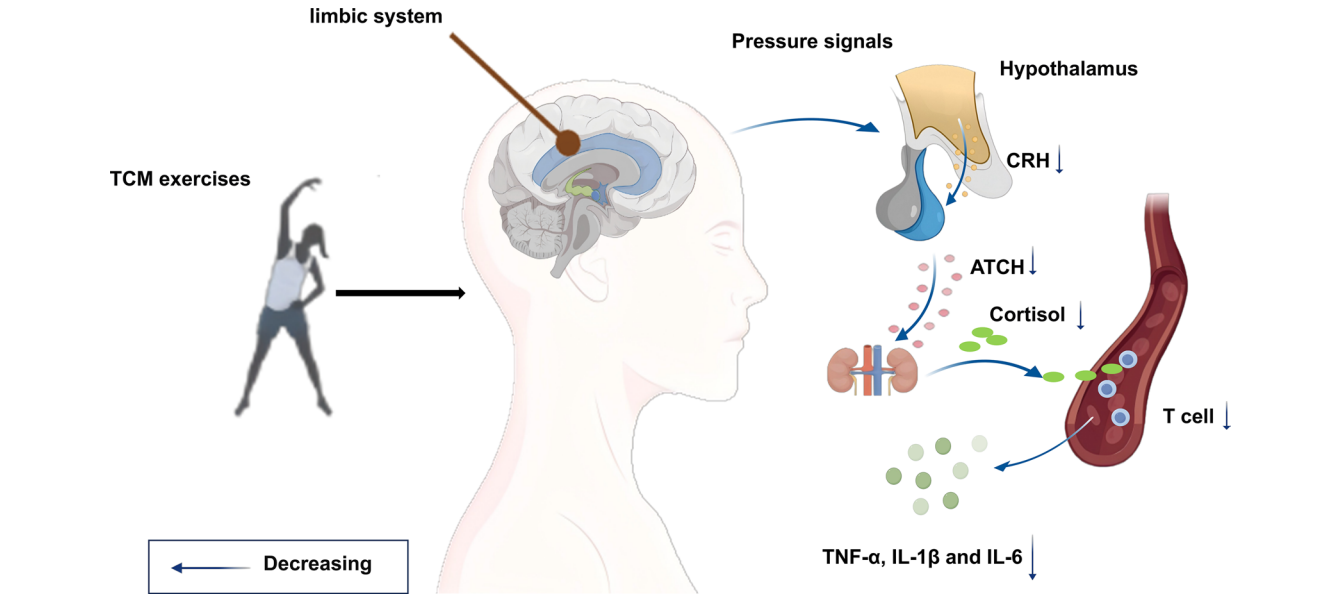


**Figure 3.** The mechanism of TCM exercises in regulating depression. TCM exercises could reduce stress signals in the limbic system, thereby reducing the level of HPA activity and the production of salivary cortisol. Cortisol could activate the immune cells in the blood, thereby triggering the inflammatory response. The decreased level of cortisol can weaken the inflammatory response in the blood and reduce the production of inflammatory factors, thereby improving depressive symptoms. ATCH: Adrenocorticotrophic hormone; CRH: Corticotropin-releasing hormone; HPA: Hypothalamic-pituitary-adrenal; IL: Interleukin; TCM: Traditional Chinese medicine; TNF-α: Tumor necrosis factor-α.

Clinical studies indicate that depression is associated with reduced GABA levels and diminished activity of GABAergic interneurons. This imbalance contributes to neural hyperexcitability, glutamate system dysfunction, and impaired glutamate metabolism, which subsequently inhibits DA production[123]. Five-element music therapy can modulate cerebral neural activity to increase limbic gray matter volume, promote catecholamine and cytokine release, and enhance glutamatergic neuron activity in the medial PFC. This cascade stimulates glutamate release, activates the nucleus accumbens—a key region for emotional regulation—and elevates extracellular DA and 5-HT levels[124], collectively improving depressive symptoms.

Moreover, five-element music therapy induces coherent resonance in body tissues through specific sound frequencies, influencing physiological parameters such as brain waves, respiratory rhythm, and heart rate. This effect reduces tension, anxiety, and depression, supporting both physical and mental health recovery. Clinical studies demonstrate that five-element music significantly reduces HAMD scores in older patients with mixed anxiety and depression and improves their quality of life[125]. Its simplicity, safety, and minimal adverse effects improve patient compliance, making it easy to implement in clinical practice. Studies have further indicated that, in both prevention and treatment, five-element music therapy can achieve notable therapeutic effects[126] and may enhance immune system function by improving coordination among internal organs. This contributes to stress adaptation and mood regulation, helping patients better cope with negative emotions.

As a non-pharmacological therapy based on TCM's five-element theory, this therapy offers unique advantages for depression management. It modulates both zang organ function and nervous system activity while maintaining high safety and patient adherence. By promoting GABA production and balancing glutamate release through neural activity regulation, five-element music therapy provides a novel approach to depression treatment. Further research into its neurobiological mechanisms will help establish stronger scientific evidence and expand its clinical applications as a safe and effective adjunctive therapy.

### *Tuina therapy*

Tuina therapy, an important component of TCM, promotes the circulation of *qi* and blood, regulates the functions of *zang-fu* organs and meridians, alleviates fatigue, exerts sedative and calming effects, enhances immune function, and supports overall rehabilitation. Studies have shown that Tuina therapy increases phosphorylation of extracellular signal-regulated protein kinase in the hippocampus and PFC, activates the extracellular signal-regulated kinase pathway, promotes BDNF expression, reduces neuronal damage, and improves depressive behaviors[127].

In patients with chronic low back pain accompanied by depressive symptoms, abdominal Tuina therapy has demonstrated superior long-term outcomes compared with the selective serotonin reuptake inhibitor (SSRI) fluoxetine[128]. Abdominal Tuina also regulates autonomic nervous system activity, promotes parasympathetic activation, balances sympathetic and parasympathetic tone, and alleviates depressive symptoms. Patient feedback highlights that Tuina therapy effectively reduces psychomotor tension, anxiety, unease, and feelings of hopelessness[129].

Collectively, evidence suggests that Tuina therapy not only improves the emotional state of patients with depression but also enhances immune function and promotes overall health by regulating *qi,* blood, and meridian flow. Clinical findings support Tuina therapy as an effective intervention for depression that integrates neuromodulation and immune regulation within the framework of TCM. When combined with pharmacotherapy, it can enhance clinical efficacy, reduce medication adverse effects, and provide more pronounced long-term benefits. As modern medical research delves deeper into its mechanisms, the scientific foundation and of Tuina therapy are expected to expand, offering patients a safer and more effective adjunctive treatment option for depression.

### *Aromatherapy*

Aromatherapy, which uses natural plant essential oils, leverages the bioactive properties of aromatic extracts to alleviate depressive symptoms. Its low cost, ease of use, and minimal side effects make it an increasingly popular complementary and alternative therapy for depression[130]. Aromatherapy can promote neurotransmitter release and induce pleasurable sensations through olfactory stimulation, as well as absorption *via* respiration, digestion, and skin, thereby mitigating depressive symptoms. Clinical studies have shown that agarwood essential oil, commonly used in aromatherapy, can cross the blood–brain barrier, increase blood levels of BDNF, and exert neuroprotective effects comparable to those of the SSRI paroxetine[131]. Aromatherapy has also been found to increase the number of Nissl bodies in the hippocampus, extend dendrite length, increase dendritic spine density, and enhance the expression of synaptic-associated proteins. Furthermore, it regulates levels of 5-HT and growth factors in both serum and cerebrospinal fluid, while reducing pro-inflammatory cytokines such as IL-1β, thereby alleviating depressive symptoms[132]. Additionally, aromatherapy influences neurotransmitter and inflammatory factor expression *via* the cyclic adenosine monophosphate and inflammatory cytokine signaling pathways, protecting neurons and contributing to antidepressant effects[133]. A study demonstrated that a 30-day aromatherapy intervention significantly decreased depression scores in older community-dwelling patients, with effects persisting 1 month post-treatment[134]. In cancer patients with depression, inhalation aromatherapy was found to be more effective than massage[135]. Research also indicates that inhaling essential oils is more effective than massage, tea, or other delivery methods, and that using a combination of essential oils produces better outcomes than single-oil approaches[136].

Overall, aromatherapy appears to alleviate depressive symptoms through neurotransmitter modulation, neuroprotection, and neuroinflammation suppression. Agarwood essential oil, in particular, shows

neuroprotective effects comparable to traditional antidepressants. While the therapy is gaining clinical recognition, its outcomes can vary based on the type of essential oil and individual response. To enhance reliability and guide clinical application, establishing standardized aromatherapy protocols and evidence-based guidelines will be essential for its role in depression management.

### *Yoga therapy*

Yoga therapy, originating in India, shares similarities with Mongolian mind–body interactive psychotherapy (MMIP) because both emphasize improving health through the integration of physical and mental well-being. By fostering self-awareness and boosting self-confidence, yoga therapy effectively alleviates negative mood states and reduces both physical and psychological stress in patients. Clinical studies have shown that yoga therapy significantly reduces depressive symptoms, in some cases achieving greater efficacy than music therapy[74]. In addition, yoga therapy enhances visceral awareness and reduces intolerance to uncertainty, disrupting mechanisms that sustain depression and thereby alleviating symptoms.

From a biological perspective, depression is associated with elevated levels of complement components, which are closely linked to inflammation and neurobiological processes. Studies have shown that after yoga interventions, patients' depression scores significantly improve and serum IL-6 levels decrease[75]. Additional research suggests that yoga therapy exerts its effects in part by modulating the complement pathway, providing new scientific support for its role as an adjunctive depression treatment[137]. Regarding oxidative stress, yoga therapy reduces oxidative damage by lowering malondialdehyde levels and increasing total antioxidant capacity in individuals with depression. Systematic reviews have also reported that yoga therapy elevates BDNF levels, which contributes to the improvement of depressive symptoms[138]. For example, after 12 weeks of yoga therapy, HAMD scores in patients with major depressive disorder decreased significantly[139]. Despite some heterogeneity in treatment response, yoga therapy consistently shows meaningful improvements in mental health outcomes[140].

Yoga therapy is considered a safe intervention with minimal adverse effects and high patient tolerance. It is most commonly used as an adjunct to standard depression treatments. Future randomized controlled trials with comprehensive safety reporting are needed to further confirm its role and optimize its application in clinical practice.

### *Meditation therapy*

Meditation therapy, rooted in both TCM and Indian Ayurvedic medicine, has gradually become an important intervention for improving outcomes in elderly patients with depression[141]. Clinical studies have confirmed that meditation therapy can alter the network characteristics of the amygdala, enhance neural connectivity, improve attention, and increase emotional stability, thereby relieving depressive symptoms[142]. Mindfulness training based on meditation therapy further optimizes brain network connectivity and strengthens the individual's ability to regulate perception. It also promotes self-acceptance and self-compassion while reducing psychological distress scores, demonstrating significant clinical value[143]. Similar to Qigong, meditation therapy exerts antidepressant effects by enhancing self-acceptance and modulating brain FC. It also contributes to the reduction of inflammatory responses. Research on patients with Parkinson disease and depression demonstrated that 2 months of meditation therapy reduced depressive symptoms and decreased IL-6 levels[144]. In addition, a clinical study in college-aged adults found that 4 weeks of meditation therapy significantly alleviated depressive symptoms. With advances in digital health technology, meditation therapy delivered *via* on-line or app-based platforms provides a convenient and accessible treatment option, further promoting its application in depression management.

### *Ayurvedic full body massage therapy*

Ayurvedic full body massage therapy, a core component of Indian Ayurvedic medicine, differs from traditional Chinese massage. This therapy involves the use of warm herbal oils to massage the entire body, aiming to induce relaxation, improve blood circulation, nourish the skin, and restore the balance of mind and body[145]. After massage therapy, elevated DA and 5-HT levels help calm the mind, while cortisol levels decrease, collectively alleviating negative mood states. Patients receiving Ayurvedic full-body massage may gradually require lower doses of antidepressant medications[88]. Unlike other non-pharmacological interventions that primarily target 5-HT and DA, Ayurvedic massage addresses depression systemically by reducing cortisol levels, which aligns with the regulatory effects observed in TCM exercise therapies.

### *Bloodletting therapy*

Bloodletting therapy, a traditional modality in TCM and a common practice in Mongolian medicine, has a long history and a distinctive theoretical foundation. It is believed to enhance bodily function by promoting *qi* and blood circulation and clearing meridians. In patients with post-stroke depression, bloodletting at specific trigger points has been shown to significantly improve TCM symptom scores and alleviate depressive symptoms[146]. For patients with depression related to insomnia, Baihui (DU20) bloodletting therapy has demonstrated superior efficacy compared with oral estazolam, effectively improving social functioning and quality of life with fewer adverse effects. When bloodletting therapy is combined with acupuncture, it can further enhance cerebral blood supply to the middle cerebral, posterior cerebral, and basilar arteries. This combination also supports vascular function and reduces levels of IL-1β and IL-6, thereby improving depressive symptoms[147].

Compared with other traditional therapies, bloodletting therapy provides stronger stimulation and shows unique benefits for post-stroke depression by reducing inflammation and enhancing systemic function. However, its clinical use remains limited owing to insufficient understanding, high technical demands, and concerns

about efficacy and safety. As research continues to clarify its mechanisms, bloodletting therapy is expected to gain wider acceptance for post-stroke depression and related conditions.

### *Hyperthermic bath therapy*

Hyperthermic bath therapy, an ancient Egyptian practice, has shown significant benefits for patients with depression when used as an adjunct to conventional treatment. Studies have demonstrated that immersing patients in a heated pool or therapeutic bath at approximately 40°C for 15 to 20 minutes can result in a marked reduction of depressive symptoms within 2 weeks, although extended treatment does not always lead to additional improvements[89]. Nevertheless, hyperthermic bath therapy retains several notable advantages. It is safe, reliable, easily accessible, and offers a simple yet effective adjunctive treatment option for individuals with depression.

### *Other non-pharmacological therapies of traditional medicine*

In traditional medicine, various non-pharmacological therapies—often integrated with modern research—offer diverse and personalized options for depression treatment. These include MMIP, TCM cognitive behavioral therapy (CBT), Mongolian medicine warming acupuncture therapy, and enema therapy.

MMIP is a psychotherapy rooted in the Mongolian medicine concept of mind–body unity and incorporates modern psychology, traditional health sciences, and group narrative therapy. It aims to localize mind–body treatment techniques and improve self-awareness in depressed patients by correcting false cognitive beliefs, reducing both mental and physical stress, and alleviating symptoms, with the potential for complete remission[148]. Clinical studies indicate that MMIP reduces negative emotions, enhances cognitive function, and avoids the stereotypes associated with traditional psychotherapy, offering a gentle and guiding effect[149]. Symptom Self-Rating Scale results have shown that MMIP significantly decreases somatization and depression scores while improving overall mental health[150]. As a stress-reduction method, MMIP treats numerous patients with a holistic approach, emphasizing a people-oriented philosophy for mental and physical well-being. MMIP, as an effective, culturally adapted psychotherapy, bridges traditional Mongolian medicine with modern psychological techniques, providing an important therapy for depression treatment. Its integrative and patient-centered framework positions it as a valuable contribution to the field of mind–body medicine.

Unlike MMIP, TCM-CBT combines Western CBT techniques with Confucian, Buddhist, and Taoist philosophies, alongside traditional behavioral methods such as guidance, prayer, and breathing exercises. It establishes a healthy "spiritual adherence" model, which significantly enhances patients' psychological well-being. Clinical studies have shown that TCM-CBT produces faster improvements in depressive mood compared with conventional CBT[86].

Mongolian medicine warming acupuncture therapy integrates acupuncture and moxibustion, using silver needle stimulation to warm meridians, regulate *qi* and blood, and enhance disease resistance. By regulating overall functional states, this therapy inhibits HPA axis hyperactivity, reduces cortisol levels, increases GABA, and restores neuroendocrine balance. It also lowers IL-1 levels in the hippocampus and PFC, and normalizes IL-6 and TNF-α, thereby regulating immune function[151]. Clinical studies have shown that compared with ordinary acupuncture or oral serin, Mongolian medicine warming acupuncture therapy offers greater relief of depressive symptoms, improves quality of life and sleep[85], and provides a safe and effective option for depression management.

Enema therapy, prominent in both TCM and Indian traditional medicine, has also demonstrated benefits in improving depression. It involves modulation of intestinal flora to restore microbiome balance, effectively alleviating depressive symptoms[90]. Enema therapy is generally well-accepted, highly tolerated, and considered safe for patients with depression.

## Prospect and implication

In recent years, traditional medicine non-pharmacological therapies have made significant progress in the treatment of depression, accumulating extensive clinical experience and gradually forming a comprehensive theoretical framework. This review examines both common and emerging therapies, highlighting their antidepressant effects achieved through mechanisms such as reducing inflammation, modulating FC in key brain regions, promoting neurotransmitter release, and enhancing cognitive function. These therapies are often incorporated into multi-modal treatment plans, demonstrating synergistic effects that improve both short- and long-term outcomes while reducing reliance on pharmacotherapy and its associated adverse effects. Notably, acupuncture and moxibustion for depression have already been included in the *Clinical Practice Guideline on Acupuncture and Moxibustion: Adult Major Depressive Disorder (Mild–Moderate Degree)*.

Despite these promising findings, some therapies such as TCM-CBT and hyperthermic bath therapy have not yet been thoroughly investigated. Current research is limited by a small number of relevant studies, lack of standardized treatment protocols, and insufficient validation of both efficacy and mechanisms, particularly in patients with chronic comorbidities.

While this review provides a comprehensive overview of non-pharmacological therapies across traditional medicine systems, several limitations remain. The current research landscape demonstrates a predominant focus on TCM, reflecting its well-developed theoretical framework and extensive clinical validation. Other traditional medical systems have equal therapeutic potential, but their relatively limited clinical application and fewer empirical studies have led to underrepresentation in the literature.

From a methodological perspective, this study was limited by its reliance on only two databases, which may have restricted the breadth and representativeness of the evidence.

Future research should prioritize three key improvements: expanding the focus to include various traditional medical systems, broadening database searches to include multilingual studies, and incorporating findings from multiple languages to reduce bias and improve the objectivity of findings.

Advances in big data and interdisciplinary research present opportunities to further develop traditional non-pharmacological therapies. For example, our team has developed a 3D-printed ear model treatment system that integrates multi-modal data to provide personalized, home-based acupuncture therapy for depression with chronic comorbidities[152]. Collaboration across fields such as psychology, neuroscience, and nutrition also contributes to understanding depression from multiple perspectives, providing a stronger scientific foundation for traditional medicine therapies.

With the development of neuromodulation techniques, the potential of traditional non-pharmacological therapies warrants further exploration. Future research should focus on multicenter, large-sample randomized controlled trials to rigorously evaluate efficacy and safety, particular attention to long-term outcomes and sustained therapeutic benefits.

Regular follow-ups will be essential to detect early relapse, assess the durability of treatment effects, and guide timely intervention. Additionally, studies should continue to clarify the neurobiological mechanisms of these therapies and optimize treatment parameters, particularly for techniques such as EA, taVNS, and TECAS.

## Conclusion

Traditional non-pharmacological therapies hold significant clinical value for the treatment and prevention of depression. They offer advantages such as high safety, minimal adverse effects, and broad applicability across different patient populations. Although certain limitations remain, ongoing research and technological advances are likely to expand their benefits and promote the development of comprehensive strategies for the prevention and treatment of emotional disorders.

## Conflict of interest statement

The authors declare no conflict of interest.

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## Author contributions

Qing Zhou, Ningyi Zou, Yanan Zhao, and Shaoyuan Li were involved in the review concept, drafting of the manuscript, editing of the manuscript, and preparing figures of the manuscript. Yuzhengheng Zhang, Gerhard Litscher, Ruoyi Wu, and Guojian Gao were involved in drafting and editing the manuscript. All authors contributed to the revision of the manuscript and approved the final submitted version.

## Ethical approval of studies and informed consent

Not applicable.

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## Data availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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