



## Journal of Advanced Pharmaceutical Sciences and Natural Products

### Journal of Advanced Pharmaceutical Sciences and Natural Products (JAPSNP)

#### MENTAL AND EMOTIONAL WELL-BEING: HERBAL SOLUTIONS FOR STRESS, ANXIETY, DEPRESSION AND SLEEP SUPPORT

**Reetu Kumari**

School of Pharmacy, YBN  
University, Ranchi, Jharkhand,  
834010, India

**Afrin Alam**

School of Pharmacy, YBN  
University, Ranchi, Jharkhand,  
834010, India

**Dr. Ashish Sarkar**

School of Pharmacy, YBN  
University, Ranchi, Jharkhand,  
834010, India

**Corresponding author:**

Reetu Kumari

**Email:**

[rectukumari0809@gmail.com](mailto:rectukumari0809@gmail.com)

**ABSTRACT**

Humans run on the energy of mental and emotional well-being, this is what creates balance in overall health. Due to a constant state of stress, anxiety, depression, and sleep disorders that most people experience today because of their recent lifestyles, they get imbalanced in their general well-being. From ancient culture, herbs have been found to serve as natural healers to promote better health. This chapter presents a comprehensive review of herbal solutions for reducing stress, anxiety, and depression, and inducing sleep ensuring improved mental and emotional well-being that leads to good health. Included are adaptogenic herbs such as Ashwagandha and Tulsi; anxiolytic herbs such as Passionflower and Lemon Balm; antidepressant herbs including St. John's Wart and Saffron; and natural sleep support solutions like Valerian root and Chamomile. This chapter further discusses how these herbs work in promoting mental and emotional health, describing how they may be integrated into daily life to achieve better health. Herbal remedies are accompanied in this chapter by a holistic approach to overall well-being that includes diet, exercise, and mindfulness.

**Keywords:** Herbs; Stress; Anxiety; Depression; Sleep; Well-Being



## Journal of Advanced Pharmaceutical Sciences and Natural Products

### 1. Introduction

Mental well-being is not just about the absence of mental disorders, instead it is a complete state of emotionally comfortable feeling, having positive feelings inside and leading a productive life<sup>1</sup>. The theory of mental well-being is majorly based on the phenomenon that extreme work pressure, stress, or any other conflicts leads to mental health issues and a state of balance between mental emotions is necessary to achieve mental well-being<sup>2</sup>.

Emotional well-being is not just about the absence of diseases in a person's body, instead it is a umbrella term which composes overall health, positive mental health, quality and productivity of life, positive emotions, positive moods, absence of any kind of negative emotions, mood or feelings<sup>3</sup>. Various studies have stated that good emotional well-being is kind of associated with overall health and reduction in disability<sup>4</sup> As per a systematic review, a state of emotional well-being in a healthy person's life is associated with reduction in any kind of mortality by 20%<sup>5</sup>.

Stress is a natural phenomenon that is associated with threats or challenges, but if left as such can lead to various serious illness. Stress is the major cause of cardiovascular diseases such as coronary heart disease and respiratory disorders<sup>6</sup>. Stress can negatively impact biological functions of body as it has the capability to alter homeostasis as well as can cause life threatening events and even lead to death<sup>7</sup>.

Anxiety is basically a response from predictable threats, and can have a major impact on cognition behaviour<sup>8</sup>. Anxiety and related disorders are one of the most prevalent mental health disorders worldwide. Anxiety is mainly

characterized by constant fear and nervousness which impacts the overall personal and social productivity of an individual .

Depression is associated with constant feeling of loneliness, sadness and a deep loss of interest in everything around a person<sup>9</sup>. Major symptoms of depression and disorders associated with it includes sadness, constant irritable mood and cognition impairment. Depression also affects the individual's capability to take decision and function properly<sup>10</sup>.

Sleep is very important to regulate the normal physiological function of brain as well as body. Sleep disturbances are one of the major cause of health related problems because sleep impacts human health directly. Lack of proper sleep or any kind of sleep disturbance leads to diminished alertness, restlessness, impaired performance and many more<sup>11</sup>. It impacts the productivity and how an individual lives a quality life<sup>12</sup>. Short term health related problems in individual can include cognition and mood disorders while long term health related problems include cardiovascular, hypertension and diabetes related issues<sup>13</sup>.

The base of total health is mental and emotional well-being, however modern lifestyles make people continuously face such stress, anxiety, depression and sleep disorders thereby throwing the total state off balance. Pharmacological treatments have been used to manage these conditions, but focus is now shifting towards herbal remedies as these are not associated with side effects as seen with conventional pharmacological treatments. This chapter helps in getting a detailed overview of herbal remedies for mental and emotional well-being to manage stress, anxiety, depression, and sleep



## Journal of Advanced Pharmaceutical Sciences and Natural Products

disturbances, along with their mechanism of action and how integration of herbal remedies with lifestyle changes in daily life can help in managing these systems and achieving a quality life.

### 2. Understanding mental and emotional imbalance

#### A. Physiological Impact of Stress (Cortisol, Adrenal Fatigue)

Stress is a normal condition that aids the human body to control threats and such situations<sup>14</sup>. When stress encounters a person, cortisol, a hormone is released which is also known as stress hormone<sup>15</sup>. This stress hormone is mainly associated with the body to prepare for flight and fight response<sup>16</sup>. Though cortisol is vital for human body, elevated levels of cortisol for prolonged time can have negative impact on the body which includes impairment in cognition, immune suppression, elevated blood sugar level and blood pressure, and also mood disturbances<sup>17</sup>. Adrenal fatigue is the condition in the body which is associated with the excessive release of cortisol from adrenal glands for a long period of time, leading to mood swings, irritated mood, and disturbed sleep, etc<sup>18</sup>.

#### B. How Neurotransmitter Imbalances play important role in Anxiety and Depression

Neurotransmitters play important role in the brain and any kind of their imbalance can lead to severe conditions. Depression and anxiety are mostly associated with imbalance of neurotransmitters namely serotonin, GABA, and dopamine in the brain.

There are many kind of serotonin (5-HT) receptors, the most commonly associated with neurotransmitter

anxiety disorder being 5-HT subtype 5-HT<sub>1A</sub><sup>19</sup>. Any disturbance in the synthesis, storage, or release of 5-HT leads to depression<sup>20</sup>. Serotonin is the mood regulator neurotransmitter and its deficiency is related to anxiety and depression disorders due to aggravation of sadness, irritation and fatigue<sup>21</sup>. GABA is another major inhibitory neurotransmitter in the brain an various studies have shown that decrease in GABA levels is associated with high anxiety levels and thus regimens which improve GABA are preferred to reduce anxiety levels. Increased GABA levels has demonstrated effectiveness in treating mental health disorders effectively<sup>22</sup>. Dopamine is another major neurotransmitter that is linked with depression. Various studies have demonstrated that low amount of dopamine binding and release is associated with people with depression<sup>23</sup>.

#### C. The Importance of Sleep for Mental Health

Sleep is associated with mental health, any disturbance in sleep pattern or regularity can lead to the occurrence of mental disorders<sup>24</sup>. Sleep disturbances may often lead to disrupted mental health, addressing these issues is associated with better mental health and thus improved quality of life<sup>25</sup>. Both hypothesis can be assumed, poor sleep disturbance leading to mental health problems and opposite<sup>26</sup>. The results of a meta-analysis showed that sleep quality affects mental health and has a dose response relationship which means improved sleep quality can be equalised with improved mental health<sup>27</sup>. Various studies have documented the relationship of sleep and mental health. According to a study, people with



## Journal of Advanced Pharmaceutical Sciences and Natural Products

insomnia had higher chances of clinical impact of depression and anxiety<sup>28</sup>. As per the observation of another study, people with insomnia had higher tendency of developing insomnia than people not suffering from insomnia<sup>29</sup>. Thus, according to these observations, it can be assumed that sleep and mental health are interlinked.

### 3. The growing interest in herbal solutions

Generally pharmacological treatments for anxiety and depression are associated with severe side effects and hence patient compliance decreases, therefore there is growing interest towards herbal solutions<sup>30</sup> for managing stress, anxiety, depression and sleep disturbances as these herbal solutions are less associated with side effects and also can be incorporated in daily life along with diet to manage the conditions. Major side effects associated with conventional pharmacological treatments include sexual dysfunction, weight gain, blunting etc. Also these pharmacological treatments are such class of drugs that may produce reliability and dependence and hence people are opting for herbal remedies to manage these conditions<sup>31</sup>. Over past decades, people are exploring herbal remedies for managing psychological conditions. <sup>32</sup>conducted a study in order to assess the choice of patients between conventional and herbal treatments for managing their psychological conditions. This study was conducted on 591 adult patients suffering from anxiety and depression. From the results, it was found that patients supported herbal treatment for managing their conditions instead of conventional medicine. The major

factor behind this was found to be adverse effects as according to the patients, they had suffered from serious adverse effects with conventional treatments. Also, during pregnancy herbal regimens are often considered to be safe. In another study, conducted by<sup>33</sup>, pregnant women with or without mild mental symptoms were studied on how they choose herbal treatments over conventional psychoactive medicine. The results obtained from the study, it was observed that pregnant females chose herbal treatment over synthetic psychoactive medicine because of good effectiveness and tolerability during pregnancy. Thus, all these studies indicates towards positive aspect of using herbal medicine over conventional treatments due to less association with side effects and better tolerability.

### 4. Herbal remedies for stress, anxiety, depression and sleep disorders

Numerous herbal therapies have been investigated for the treatment of stress, anxiety, depression, and sleep disorders. Table 1 lists the main plants used to treat these conditions, along with their phytoconstituents and mode of action.



## Journal of Advanced Pharmaceutical Sciences and Natural Products

**Table 1: Herbal remedies for stress, anxiety, depression and sleep disorders**

Major action	Name of the plant	Botanical name	Major phytoconstituent responsible for action	Mechanism of action	Reference
<b>Adaptogens for stress relief</b>	Ashwagandha	<i>Withania somnifera</i>	Withanolides	Reduce corticosterone level	34
	Holy basil	<i>Ocimum sanctum</i>	Eugenol and ocimumosides	Regulates HPA axis and decrease corticosterone levels	35
	Guduchi	<i>Tinospora cordifolia</i>	Berberine	Helps in modulation of stress hormone levels	36
	Shankhapushpi	<i>Convolvulus pluricaulis</i>	Convolvine,	Reduction in stress induced oxidative damage	37
<b>Anxiolytic herbs for anxiety</b>	Ashwagandha	<i>Withania somnifera</i>	Withanolides	Increase in GABA content in brain	38
	Passionflower	<i>Passiflora incarnata</i>	Vitexin	Increase GABA levels and reduced neuronal excitability	39
	Chamomile	<i>Matricaria recutita</i>	Apigenin	Enhanced inhibitory signaling	40
	Lemon Balm	<i>Melissa officinalis</i>	Rosmarinic acid	Increase GABA by blocking GABA transaminase	41
	Brahmi	<i>Bacopa monnieri</i>	Bacosides	Modulation of GABA and serotonin pathways	42
<b>Herbal support for depression</b>	St. John's Wort	<i>Hypericum perforatum</i>	Hyperforin	Inhibition of serotonin and norepinephrine	43
	Saffron	<i>Crocus sativus</i>	Safranal	Modulation of serotonin and dopamine	44
	Rose root	<i>Rhodiola rosea</i>	Salidroside	Enhance serotonin and dopamine levels	45
<b>Natural solutions for sleep support</b>	Valerian root	<i>Valeriana officinalis</i>	Valerenic acid	Increase GABA levels by blocking GABA breakdown	46
	Chamomile	<i>Matricaria recutita</i>	Apigenin	Binding to Benzodiazepine receptors	47
	Passionflower	<i>Passiflora incarnata</i>	Vitexin, chrysin	Increase in GABA levels	48



## Journal of Advanced Pharmaceutical Sciences and Natural Products

### 5. Mechanisms of herbal action on the nervous system

There are various mechanisms by which herbal remedies exert their action on the nervous system mainly in stress, anxiety, depression and sleep disorders.

- **Modulation of neurotransmitters**

According to<sup>49</sup>, neurotransmitter modulation remains the major pathway by which herbs can produce action. The modulation of neurotransmitters such as dopamine, serotonin, GABA, and others play important role in managing brain related conditions. A variety of plants, including ashwagandha, passionflower, guduchi, shankhapushpi and others, work by modulating brain neurotransmitters and helps in reducing stress, anxiety, and depression.

- **Regulation of Hypothalamic-Pituitary-Adrenal (HPA) axis**

Maintenance of cortisol level and regulation of HPA axis has been found to be crucial for proper nervous system function. Herbs such as tulsi, rhodiola, ashwagandha etc. exert their action in the brain via this mechanism<sup>50</sup>.

- **Neuroreceptor binding**

Some plants exert their action by binding to the neuroreceptors such as GABA or benzodiazepine receptors. Example includes chamomile and kava.

- **Enzyme inhibition**

An essential enzyme in the nervous system, GABA transaminase degrades GABA, causing anxiety and depression. Therefore, GABA transaminase inhibition, which raises GABA concentration, is another way that plants affect anxiety and sadness

- **Promotion of neuroplasticity**

Upregulation of brain-derived neurotrophic factor (BDNF) helps in supporting neurogenesis and thus promotes neuroplasticity and prevents brain from stress related damage<sup>51</sup>.

### 6. Preclinical studies

Plants have shown effectiveness in managing stress, anxiety, depression and sleep disturbances, various animal models have explored to study the effect of herbal plants and their components in managing stress, anxiety, depression and sleep disturbances. Table 2 summarizes preclinical studies conducted for assessing efficacy.

### 7. Clinical trials

Several clinical trials have been done over years to assess the safety and efficacy of herbal plants in managing these conditions. This table contains information regarding various clinical trials conducted using different herbal plants in the management of conditions such as stress, anxiety, depression and sleep disturbances. Following information has been obtained from [clinicaltrials.gov/](http://clinicaltrials.gov/) Table 3 summarizes clinical trials conducted for assessing efficacy of herbs.



## Journal of Advanced Pharmaceutical Sciences and Natural Products

**Table 2: Preclinical studies conducted for assessing efficacy of herbs**

Herb/intervention	Target condition	Animal model	Dose	Result and Conclusion	References
Fameeyes	Stress	Rats	200 mg for four weeks	Reduction in levels of ACTH, corticosterone and serotonin leading to significant anti-stress activity	52
Valerian root	Insomnia and anxiety	Rats	valerian root extract (3 ml/kg), valerenic acid (3 mg/kg), or a solution of valerenic acid	Reduction in anxious behaviour	53
	Sleep problem	BALB/c mice	Valerian extract (100 or 300 mg/kg)	Reduced sleep onset time and enhanced sleep quality	45
Ashwagandha	Sleep disturbance	Swiss albino mice	10, 25 or 50 mg (w/v) of ashwagandha extract	Decrease in sleep onset time and increase in sleep duration	53
	Stress	Kathiawari horses	2,5 and 10 gm/animal	Decrease in cortisol and epinephrine levels leading to potent antistress activity	54
	Depression-like behaviour	Mice	100 and 200 µg/mL	Significant neuroprotective and antidepressant activity	55
	Stress	Mice	3.3, 10, 33.3, or 100 mg/kg Withania extract	Antidepressant and anxiolytic effects were observed	56
Holy basil	Anxiety	Wistar rats	100 mg/kg for six days	Significant anti-anxiety activity	57
	Depression	Albino mice	4 and 8 mg/kg	Significant anti-depressant activity	58
	Stress	Sprague-dawley rats	40 mg/kg body weight	Ocimarin was able to normalise the stress parameters	59
Chamomile	Depressive like behaviour	Wistar kyoto rats	Inhalation therapy	Increased expression of proteins leading to reduction in depressive like behaviour	60
Chamomile and lemon balm	Anxiety and stress related problems	Zebra fish	NA	Significant reduction in anxiety and stress problems	61
Lemon balm	Anxiety	BALB/c mice	25 mg/kg	Significant reduction in motor impairment	62



## Journal of Advanced Pharmaceutical Sciences and Natural Products

Saffron	Sleep disturbance	Female rats	25, 50, and 75 mg/kg	REM study showed decreased anxiety and depression like behaviour	63
	Depression	Rats	20 and 40 mg/kg	Significant improvement in depression symptoms	64
	Sleep disorders	Adult male wistar rats	150 mg/kg for 7 days	Reduction in kynurenine levels and promotion in melatonin levels leading to improved mood and sleep disorders	65
Guduchi	Sleep disturbances	Adult female wistar rats	50% ethanolic extract	Modulation of stress induced biomarkers and improvement in sleep	66
	Stress	Mice	100 and 200 mg/kg	Reduction in stress related behavioural symptoms	67
Brahmi	Stress induced depression	Male sprague-dawley rats	40-120 mg/kg	Alleviation of depression symptoms	68
St. John's wort	Sleep disturbance and anxiety	Mice	200 and 400 mg/kg	Improved locomotor action and anti-stress activity	69
Rose root	Anxiety and stress	Female C57BL/6 mice	3% salidoside	Reduction in corticosterone levels and improvement in locomotion	70
Passion flower	Anxiety	Male wistar albino glaxo rats	300 mg/kg b.w	Increase in GABAergic and dopamine levels	71
Kava	Anxiety	Mice	300 mg/kg b.w	Reduction in corticosterone levels	72
Rosemary	Depression and anxiety	Male ICR mice	10 mg/kg and 100 mg/kg	Attenuation of brain neurotransmitters leading to reduced stress	73
Turmeric	Sleep disturbance	Mice	NA	Reduction in sleep latency and increase in sleep duration	74



## Journal of Advanced Pharmaceutical Sciences and Natural Products

<b>Herb/intervention</b>	<b>Target condition</b>	<b>Study design</b>	<b>Sample size/population</b>	<b>Dose and duration</b>	<b>Main findings</b>	<b>Clinical trial identifier</b>
<b>Ashwagandha</b>	Stress and sleep	Double-blinded Randomized Control Trial	60 healthy students	700 mg/day for 30 days	It was found to be helpful in managing stress and sleep problems associated with it	NCT05430685
<b>Ashwagandha</b>	Generalized anxiety disorder	Double-Blind, Parallel Group, Randomized, Placebo Controlled	120	250 mg for 7 weeks	Reduction in anxiety level	NCT01311180
<b>Holy basil</b>	Stress and anxiety	Randomised placebo-controlled clinical trial.	30	Capsules containing leaves of tulsi for 6 weeks	Significant reduction in stress and anxiety levels	NCT03184909
<b>Lavender</b>	Sleep quality and mood	Interventional	60	50% lavender oil diluted in fractionated coconut oil	Improved sleep quality and mood	NCT03093454
<b>Lavender</b>	Post traumatic stress disorder	Double-blinded Randomized Control Trial	224	Two 80 mg silexan daily for 12 weeks	Reduction in stress levels	NCT06412757
<b>Passion flower</b>	Mild and moderate anxiety	Double blind and randomized	150	1 tablet PO twice a day for 6 weeks	Reduction in HMA score	NCT00794456
<b>Passion flower</b>	Acute stressful situations	Randomised placebo-controlled clinical trial.	60	425 mg 3 X1 tablet per day for 3 days	Reduced stress and improved well-being	NCT01665170
<b>Chamomile</b>	Chronic primary insomnia	Randomized, double-blind placebo controlled	34	3 tablets each (equivalent to 7.5 g of dried herb) p.o. twice daily for 28 days	Improved sleep efficiency and total sleep time	NCT01286324
<b>Chamomile</b>	Anxiety	Double blind placebo controlled	180 patients with moderate to severe Generalised Anxiety Disorder	500 mg 3 times daily for 26 weeks	Symptomatic improvement associated with decreased cortisol	NCT01072344
<b>Lemon balm</b>	Stress, depression, anxiety and sleep	Randomized, double-blind placebo controlled	102	200 mg tablet twice a day for 3 weeks	Reduction in stress, anxiety and depression levels and improvement in sleep	NCT05602688
<b>Lemon balm</b>	Cognition and mood	Randomized, parallel assignment	123	300 mg capsules	Improvement of cognition and mood	NCT06183372
<b>Brahmi</b>	Anxiety	Randomized,	84	225 mg capsules	Reduction in	NCT02462642



## Journal of Advanced Pharmaceutical Sciences and Natural Products

		double-blind placebo controlled		twice a day for 12 weeks	anxiety levels	
<b>Rhodiola and saffron</b>	Mild to moderate major depression	Observational	52	Dose not available, duration: 42 days	Reduction of values in depression scale	NCT02981225
<b>Rhodiola</b>	Major depressive disorder	Interventional	58	340-1,360 mg daily for 12 weeks	Reduction of values in depression scale	NCT01098318
<b>St. John's wort</b>	Depression	Observational	55	Daily intake of tinctures for 6 weeks	Reduction of values in depression scale	NCT05477472
<b>St. John's wort and kava</b>	Major depressive disorder with comorbid anxiety	Interventional	50	NA	Reduction in depression symptoms	NCT00451516
<b>Valerian</b>	Sleep disturbance	Interventional	18	100 mg softgels, 3 softgels each night for 2 weeks, 30 minutes before bedtime	Improvement in sleep quality	NCT00097604
<b>Valerian and lavender</b>	Sleep problem	Randomized, parallel assignment	114	1 tablet/day	Improvement in sleep quality	NCT05194618
<b>Eschscholtzia and valerian</b>	Anxiety related sleep disorders	Randomized	109	3 tablets every day for 28 days	Reduction in Insomnia Severity Index (ISI) score	NCT04812418

### 8. Integrating lifestyle approach (Diet, Exercise and mindfulness) into daily life for better health

This approach is mainly based on the observation that health is not just associated with physical aspects of a person instead it also involves lifestyle aspects such as diet, exercise, and social habits that majorly affects the health of an individual<sup>75</sup>. Lifestyle choices such as diet, exercise, and mindfulness is associated with better health outcomes, hence it becomes necessary to integrate lifestyle approach along with herbal remedies in daily life in order to achieve better health. According to the results obtained from a systematic review and meta-analysis<sup>76</sup>, it was found that lifestyle intervention such as change in diet, exercise patterns, and sleep hygiene can help in reducing symptoms

of anxiety, depression, and sleep disturbances. This outcome was observed by thoroughly studying 96 randomised clinical trial studies. Physical activity has been shown to reduce symptoms of mental illness and can be as effective as conventional pharmacological treatments. Physical activity has been associated with improved quality of life in patients with mental illness<sup>77</sup>. In another systematic review, the impact of healthy lifestyle approaches on mental health and well-being was assessed. A total of 29 scientific papers were assessed and it was observed that healthy lifestyle approaches serves as indicator of improved mental health and well-being<sup>78</sup>. In another systematic review, 23 review articles were assessed on how lifestyle interventions improves quality



## Journal of Advanced Pharmaceutical Sciences and Natural Products

of life of adults with serious mental illness. It was observed from various studies that exercise and dietary counselling can help in improving mental health and well-being of patients with serious mental illness and can enhance their recovery and may also help in reducing premature mortality.

### 9. Challenges with herbal remedies

Although there is boom in the herbal remedies industry for managing various diseases and conditions, still there are many challenges that are regularly encountered.

The major challenges associated with herbal remedies are-

- **Improper standardization and quality control**

Plants are harvested in various temperature, soil conditions and many other things, due to which, concentration of active ingredients vary in different plants, and makes the dosing and efficacy unpredictable. Due to improper standardization, there is difficulty in measuring therapeutic outcome<sup>79</sup>.

- **Lack of high quality clinical trials**

Although preclinical research has been done for herbal remedies, still there is lack of high quality clinical trials. Some trials which are available are poorly designed, do not have sufficient population<sup>80</sup>, hence outcome measures can not be compared. To ensure robust results, there is need to design proper clinical trials, and standardized research protocols.

- **Interactions**

Most of the herbal remedies have been associated with drugs for possible interactions such as kava can cause liver toxicity if combined with other drugs, similarly St. John's wort can reduce the efficacy of other drugs and can cause possible side effects as well<sup>81</sup>.

- **Complexity of herbal medicines**

Herbal remedies are not like conventional pharmacological treatments do not contain single active compound, instead they contain numerous active compounds and hence are complex in nature which may be responsible for synergistic or antagonistic actions. Understanding the complex mechanism of action and isolation of particular active compound from variety of components is complex<sup>82</sup>.

- **Potential for adulteration and contamination**

Unlike pharmacological treatments, herbal remedies have high chances of adulteration and contamination as they are derived from natural source. Herbal preparations can be adulterated with heavy metals and pesticides and can pose risk for human life.

- **Insufficient information about mechanism of action**

Although some literature regarding mechanism of action or mechanistic pathways is known, yet there is need of more studies to understand the exact mechanistic pathways.



## Journal of Advanced Pharmaceutical Sciences and Natural Products

### 10. Future directions in herbal research

In order to ensure reproducible outcomes, there is need of advanced standardization methods and proper quality control techniques<sup>83</sup>. Also, research on humans in the form of clinical trials is required to ensure the safety and efficacy of herbal remedies<sup>84</sup>. There are limited delivery systems for delivering active constituents like phytosomes but these do have their own limitations, so research should be directed towards searching for more delivery systems. In order to clarify the mechanistic pathways, there is need of advanced technologies like genomics and proteomics to understand the mechanistic pathways from a better perspective<sup>85</sup>. Only herbal remedies may not be that effective in managing conditions, hence they are often combined with lifestyle and integrative approaches to make them more effective, hence such models should be established so that efficacy can be increased. Also, there is need of ethnobotanical preservation and sustainability.

### 11. Conclusion

Stress, anxiety, depression, and sleep disturbances are the major causes that impact health of an individual in a negative way and is also associated with many health related problems. Mental and emotional well-being is a multifaceted journey and herbal remedies can offer support for these challenges. Conventional pharmacological treatments for these conditions are associated with severe side effects and dependence, hence preference is shifting towards herbal remedies for managing these conditions as they do not possess side effects and also can be integrated in daily life along with lifestyle changes. Various herbs such as Ashwagandha, Passion flower, Holy Basil, St. John's Wort etc. have been found to be useful in managing these conditions, however, more clinical

studies and standardization methods are required to ensure complete effectiveness.

### Abbreviations

**COPD:** Chronic Obstructive Pulmonary Disease; **HPA:** Hypothalamic-Pituitary-Adrenal; **HMA:** Hamilton Anxiety Rating; **GABA:** Gamma aminobutyric acid; **5-HT:** 5-hydroxy tryptophan; **BDNF:** brain-derived neurotrophic factor; **ACTH:** Adrenocorticotrophic hormone; **REM:** Rapid eye movement

### REFERENCES

1. Rachmad YE. Mental Well-being Theory [Internet]. 2022. Available from: <https://doi.org/10.17605/osf.io/z8ekx>
2. Baldwin D, Sinclair J, Simons G. What is mental wellbeing? *BJPsych Open*. 2021;7(S1):S236.
3. Feller SC, Castillo EG, Greenberg JM, Abascal P, Van Horn R, Wells KB, et al. Emotional well-being and public health: proposal for a model national initiative. *Public Health Rep*. 2018;133(2):136-41. doi: 10.1177/0033354917751634
4. Diener E, Chan MY. Happy people live longer: subjective well-being contributes to health and longevity. *Appl Psychol Health Well-Being*. 2011;3(1):1-43. doi: 10.1111/j.1758-0854.2010.01045.x
5. Chida Y, Steptoe A. Positive psychological well-being and mortality: a quantitative review of prospective observational studies. *Biopsychosocial Sci Med*. 2008;70(7):741-56. doi: 10.1097/PSY.0b013e31818105ba
6. Merrill RM. Mental health conditions according to stress and sleep disorders. *Int J Environ Res Public Health*. 2022;19(13):7957. doi: 10.3390/ijerph19137957



## Journal of Advanced Pharmaceutical Sciences and Natural Products

7. Yaribeygi H, Panahi Y, Sahraei H, Johnston TP, Sahebkar A. The impact of stress on body function: a review. *EXCLI J.* 2017;16:1057. doi: 10.17179/excli2017-480
8. Robinson OJ, Vytal K, Cornwell BR, Grillon C. The impact of anxiety upon cognition: perspectives from human threat of shock studies. *Front Hum Neurosci.* 2013;7:203. doi: 10.3389/fnhum.2013.00203
9. Wu Y, Li X, Ji X, Ren W, Zhu Y, Chen Z, Du X. Trends in the epidemiology of anxiety disorders from 1990 to 2021: a global, regional, and national analysis with a focus on the sociodemographic index. *J Affect Disord.* 2025;373:166-74. doi: 10.1016/j.jad.2023.05.101
10. Cui R. A systematic review of depression. *Curr Neuropharmacol.* 2015;13(4):480. doi: 10.1371/journal.pone.0285012
11. Hungin APS, Close H. Sleep disturbances and health problems: sleep matters. *Br J Gen Pract.* 2010;60(574):319-20. doi: 10.3399/bjgp10X484093
12. Lee M, Choh AC, Demerath EW, Knutson KL, Duren DL, Sherwood RJ, et al. Sleep disturbance in relation to health-related quality of life in adults: the Fels Longitudinal Study. *J Nutr Health Aging.* 2009;13:576-83. doi: 10.1007/s12603-009-0126-y
13. Medic G, Wille M, Hemels ME. Short- and long-term health consequences of sleep disruption. *Nat Sci Sleep.* 2017;151-61. doi: 10.2147/NSS.S134864
14. Maddock A. The relationships between stress, burnout, mental health and well-being in social workers. *Br J Soc Work.* 2024;54(2):668-86. doi: 10.1093/bjsw/bcad172
15. James KA, Stromin JI, Steenkamp N, Combrinck MI. Understanding the relationships between physiological and psychosocial stress, cortisol and cognition. *Front Endocrinol (Lausanne).* 2023;14:1085950. doi: 10.3389/fendo.2023.1085950
16. Knezevic E, Nenic K, Milanovic V, Knezevic NN. The role of cortisol in chronic stress, neurodegenerative diseases, and psychological disorders. *Cells.* 2023;12(23):2726. doi: 10.3390/cells12232726
17. Heard KJ, Shokhirev MN, Becronis C, Fredlender C, Zahid N, Le AT, et al. Chronic cortisol differentially impacts stem cell-derived astrocytes from major depressive disorder patients. *Transl Psychiatry.* 2021;11(1):608. doi: 10.1038/s41398-021-01700-z
18. Huang YM, Chi CW, Wu PS, Tai HC, Chien MN, Chen YJ. Adrenal gland irradiation causes fatigue accompanied by reactive changes in cortisol levels. *J Clin Med.* 2022;11(5):1214. doi: 10.3390/jcm11051214
19. Baldwin D, Rudge S. The role of serotonin in depression and anxiety. *Int Clin Psychopharmacol.* 1995;9 Suppl 4:41-5.
20. Liu L, Liu C, Wang Y, Wang P, Li Y, Li B. Herbal medicine for anxiety, depression and insomnia. *Curr Neuropharmacol.* 2015;13(4):481-507. doi: 10.2174/1570159X1304150831150507
21. Cutler AJ, Mattingly GW, Maletic V. Understanding the mechanism of action and clinical effects of neuroactive steroids and GABAergic compounds in major depressive disorder. *Transl Psychiatry.* 2023;13(1):228. doi: 10.1038/s41398-023-02459-7
22. Kao CH. Neurotransmitters and their influence on mental health disorders. *Neurosci Psychiatry Open Access.* 2024;7(6):284-6.



## Journal of Advanced Pharmaceutical Sciences and Natural Products

23. Tamura T, Sugihara G, Okita K, Mukai Y, Matsuda H, Shiwaku H, et al. Dopamine dysfunction in depression: application of texture analysis to dopamine transporter single-photon emission computed tomography imaging. *Transl Psychiatry*. 2022;12(1):309. doi: 10.1038/s41398-022-02166-8
24. Freeman D, Sheaves B, Goodwin GM, Yu LM, Nickless A, Harrison PJ, et al. The effects of improving sleep on mental health (OASIS): a randomised controlled trial with mediation analysis. *Lancet Psychiatry*. 2017;4(10):749-58. doi: 10.1016/S2215-0366(17)30328-0
25. Winkelman JW. How to identify and fix sleep problems: better sleep, better mental health. *JAMA Psychiatry*. 2020;77(1):99-100. doi: 10.1001/jamapsychiatry.2019.2987
26. Alvaro PK, Roberts RM, Harris JK. A systematic review assessing bidirectionality between sleep disturbances, anxiety, and depression. *Sleep*. 2013;36(7):1059-68. doi: 10.5665/sleep.2810
27. Scott AJ, Webb TL, Martyn-St James M, Rowse G, Weich S. Improving sleep quality leads to better mental health: a meta-analysis of randomised controlled trials. *Sleep Med Rev*. 2021;60:101556. doi: 10.1016/j.smrv.2021.101556
28. Taylor DJ, Lichstein KL, Durrence HH, Reidel BW, Bush AJ. Epidemiology of insomnia, depression, and anxiety. *Sleep*. 2005;28(11):1457-64. doi: 10.1093/sleep/28.11.1457
29. Baglioni C, Battagliese G, Feige B, Spiegelhalder K, Nissen C, Voderholzer U, et al. Insomnia as a predictor of depression: a meta-analytic evaluation of longitudinal epidemiological studies. *J Affect Disord*. 2011;135(1-3):10-9.
30. Kenda M, Kočevar Glavač N, Nagy M, Sollner Dolenc M. Medicinal plants used for anxiety, depression, or stress treatment: an update. *Molecules*. 2022;27(18):6021. doi: 10.3390/molecules27186021
31. Garg A. Nature's mental health toolkit: herbal remedies for anxiety and depression. *Res J Pharmacogn Phytochem*. 2025;17(1):45-8.
32. Burstein O, Shamir A, Abramovitz N, Doron R. Patients' attitudes toward conventional and herbal treatments for depression and anxiety: a cross-sectional Israeli survey. *Int J Soc Psychiatry*. 2022;68(3):589-99. doi: 10.1177/00207640211039403
33. Gantner G, Spiess D, Randecker E, Quack Lötscher KC, Simões-Wüst AP. Use of herbal medicines for the treatment of mild mental disorders and/or symptoms during pregnancy: a cross-sectional survey. *Front Pharmacol*. 2021;12:729724. doi: 10.3389/fphar.2021.729724
34. KrishnaRaju AV, Somepalli V, Thanawala S, Shah R. Efficacy and anti-inflammatory activity of Ashwagandha sustained-release formulation on depression and anxiety induced by chronic unpredictable stress: in vivo and in vitro studies. *J Exp Pharmacol*. 2023;291-305. doi: 10.2147/JEP.S415486
35. Works HP, NY N, Rupa O, Patient FAQ. Harnessing holy basil for stress relief and hormonal regulation in endocrine health. *Endocrinology*. 2024.
36. Ashwini LS, KG MR, Rai KS, Shetty SB, Rao G, EG PU, et al. Treatment with *Tinospora cordifolia* ameliorates prenatal stress and maternal separation-induced memory deficits by restoring amygdaloid neuronal architecture. *J Herbmed Pharmacol*. 2024;13(4):606-19. doi: 10.34172/jhp.2024.51517
37. Chandra P, Ali Z, Fatima N, Sharma H, Sachan N, Sharma KK, Verma A.



## Journal of Advanced Pharmaceutical Sciences and Natural Products

- Shankhpushpi (Convolvulus pluricaulis): exploring its cognitive enhancing mechanisms and therapeutic potential in neurodegenerative disorders. *Curr Bioact Compd.* 2025;21(2):E290424229510.
38. Park CW, Hong KB, Suh HJ, Ahn Y. Sleep-promoting activity of amylase-treated Ashwagandha (*Withania somnifera* L. Dunal) root extract via GABA receptors. *J Food Drug Anal.* 2023;31(2):278. doi: 10.38212/2224-6614.3456
39. Ibarra-Flores D, Perez-Sanchez G, Rodriguez-Romo LE, Demeneghi-Rivero A, Olvera-García V, Angulo-Bejarano PI, et al. Anxiolytic and concentration-stimulating properties of valeriana and passiflora: chemical composition and antioxidant activity. In: *Functional Foods and Nutraceuticals for Human Health.* Apple Academic Press; 2021. p. 3-44.
40. Saadatmand S, Zohroudi F, Tangestani H. The effect of oral chamomile on anxiety: a systematic review of clinical trials. *Clin Nutr Res.* 2024;13(2):139.
41. Zam W, Quispe C, Sharifi-Rad J, López MD, Schoebitz M, Martorell M, Pezzani R. An updated review on the properties of *Melissa officinalis* L.: not exclusively anti-anxiety. *Front Biosci-Scholar.* 2022;14(2):16. doi: 10.52586/4921
42. Balkrishna A, Agarwal U, Arya D, Chaudhary S, Arya V. From tradition to evidence: exploring the neurochemical basis of medicinal plants in anxiety therapy. *World J Biol Psychiatry.* 2025;1-38.
43. Benitez JSC, Hernandez TE, Sundararajan R, Sarwar S, Arriaga AJ, Khan AT, et al. Advantages and disadvantages of using St. John's wort as a treatment for depression. *Cureus.* 2022;14(9). doi: 10.7759/cureus.29071
44. Chen Z, Gu J, Lin S, Xu Z, Xu H, Zhao J, Wang P. Saffron essential oil ameliorates CUMS-induced depression-like behavior in mice via the MAPK-CREB1-BDNF signaling pathway. *J Ethnopharmacol.* 2023;300:115719. doi: 10.1016/j.jep.2023.115719
45. Sahin K, Gencoglu H, Korkusuz AK, Orhan C, Aldatmaz İE, Erten F, et al. Impact of a novel valerian extract on sleep quality, relaxation, and GABA/serotonin receptor activity in a murine model. *Antioxidants.* 2024;13(6):657. doi: 10.3390/antiox13060657
46. Alvaro PK, Roberts RM, Harris JK. A systematic review assessing bidirectionality between sleep disturbances, anxiety, and depression. *Sleep.* 2013;36(7):1059-68. doi: 10.5665/sleep.2810
47. Kaźmierczyk I, Bychowski M, Kwaśna J, Załęska A, Lenart K, Górski M, Kulicka J. *Passiflora incarnata* as an adjunctive treatment for anxiety and sleep disorders. *Quality in Sport.* 2024;35:56361.
48. Mora F, Segovia G, Del Arco A, de Blas M, Garrido P. Stress, neurotransmitters, corticosterone and body-brain integration. *Brain Res.* 2012;1476:71-85. doi: 10.1016/j.brainres.2012.02.049
49. CM MG, Murugan SK, Bethapudi B, Purusothaman D, Mundkinajeddu D, D'Souza P. *Ocimum tenuiflorum* extract (HOLIXER™): possible effects on hypothalamic-pituitary-adrenal (HPA) axis in modulating stress. *PLoS One.* 2023;18(5):e0285012. doi: 10.1371/journal.pone.0285012
50. Grover S, Narang RK, Singh S. GABA-transaminase: a key player and potential therapeutic target for neurological disorders. *CNS Agents Med Chem.* 2024;24(1):57-67. doi: 10.1080/15247080.2024.2311111



## Journal of Advanced Pharmaceutical Sciences and Natural Products

- 10.2174/187152492466623100617454  
1
51. Toricelli M, Pereira AAR, Abrao GS, Malerba HN, Maia J, Buck HS, Viel TA. Mechanisms of neuroplasticity and brain degeneration: strategies for protection during the aging process. *Neural Regen Res.* 2021;16(1):58-67. doi: 10.4103/1673-5374.291381
  52. Hong J, Lee TK, Kim IH, Lee S, Jeon BJ, Lee J, Kim S. Anti-stress effects of Fameyes in in vitro and in vivo models of stresses. *Lab Anim Res.* 2022;38(1):39. doi: 10.1186/s42826-022-00136-6
  53. Murphy K, Kubin ZJ, Shepherd JN, Ettinger R. Valeriana officinalis root extracts have potent anxiolytic effects in laboratory rats. *Phytomedicine.* 2010;17(8-9):674-8. doi: 10.1016/j.phymed.2009.12.015
  54. Murthy SV, Fathima SN, Mote R. Hydroalcoholic extract of ashwagandha improves sleep by modulating GABA/histamine receptors and EEG slow-wave pattern in in vitro-in vivo experimental models. *Prev Nutr Food Sci.* 2022;27(1):108. doi: 10.3746/pnf.2022.27.1.108
  55. Priyanka G, Anil Kumar B, Lakshman M, Manvitha V, Kala Kumar B. Adaptogenic and immunomodulatory activity of Ashwagandha root extract: an experimental study in an equine model. *Front Vet Sci.* 2020;7:541112. doi: 10.3389/fvets.2020.541112
  56. Kim H, Choi HS, Han K, Sim W, Suh HJ, Ahn Y. Ashwagandha (*Withania somnifera* (L.) dunal) root extract containing withanolide alleviates depression-like behavior in mice by enhancing the brain-derived neurotrophic factor pathway under unexpected chronic mild stress. *J Ethnopharmacol.* 2025;340:119224. doi: 10.1016/j.jep.2024.119224
  57. Dey A, Chatterjee SS, Kumar V. Triethylene glycol-like effects of Ashwagandha (*Withania somnifera* (L.) Dunal) root extract devoid of withanolides in stressed mice. *AYU.* 2018;39(4):230-8.
  58. Jagdale SG, Limaye RP, Kulkarni RP. Effects of *Ocimum sanctum* in relieving anxiety: an experimental study. *Int J Adv Res.* 2019;7(9):1003-5. doi: 10.21474/IJAR01/9726
  59. Sampath S, Mahapatra SC, Padhi MM, Sharma R, Talwar A. Holy basil (*Ocimum sanctum* Linn.) leaf extract enhances specific cognitive parameters in healthy adult volunteers: a placebo controlled study. *Indian J Physiol Pharmacol.* 2015;59(1):69-77.
  60. Gupta P, Yadav DK, Siripurapu KB, Palit G, Maurya R. Constituents of *Ocimum sanctum* with antistress activity. *J Nat Prod.* 2007;70(9):1410-6. doi: 10.1021/np070126h
  61. Kong Y, Wang T, Wang R, Ma Y, Song S, Liu J, Li S. Inhalation of Roman chamomile essential oil attenuates depressive-like behaviors in Wistar Kyoto rats. *Sci China Life Sci.* 2017;60(6):647-55. doi: 10.1007/s11427-016-0362-0
  62. Tavares TRP. Development of a plant-based beverage with anxiolytic-like effects evaluated in zebrafish (*Danio rerio*) model. 2023.
  63. Stojanović NM, Mladenović MZ, Maslovarić A, Stojiljković NI, Randjelović PJ, Radulović NS. Lemon balm (*Melissa officinalis* L.) essential oil and citronellal modulate anxiety-related symptoms—in vitro and in vivo studies. *J Ethnopharmacol.* 2022;284:114788. doi: 10.1016/j.jep.2021.114788
  64. Houshyar M, Karimi H, Ghofrani-Jahromi Z, Nouri S, Vaseghi S. Crocin (bioactive compound of *Crocus sativus*



## Journal of Advanced Pharmaceutical Sciences and Natural Products

- L.) potently restores REM sleep deprivation-induced manic- and obsessive-compulsive-like behaviors in female rats. *Behav Pharmacol.* 2024;35(4):239-52. doi: 10.1097/FBP.0000000000000779
65. Corridori E, Salviati S, Demontis MG, Vignolini P, Vita C, Fagiolini A, Scheggi S. Therapeutic potential of saffron extract in mild depression: a study of its role on anhedonia in rats and humans. *Phytother Res.* 2025;39(3):1277-91.
66. De la Fuente Muñoz M, Román-Carmena M, Amor S, García-Villalón ÁL, Espinel AE, González-Hedström D, Granado García M. Effects of supplementation with the standardized extract of saffron (affron®) on the kynurenine pathway and melatonin synthesis in rats. *Antioxidants.* 2023;12(8):1619. doi: 10.3390/antiox12081619
67. Mishra R, Manchanda S, Gupta M, Kaur T, Saini V, Sharma A, Kaur G. *Tinospora cordifolia* ameliorates anxiety-like behavior and improves cognitive functions in acute sleep deprived rats. *Sci Rep.* 2016;6(1):25564.
68. Ranjan G, Sunita P, Bose P, Banerjee S, Pattanayak SP. *Tinospora cordifolia* ameliorates behavioral deficits in conditioned fear and single prolonged stress-induced preclinical PTSD model in mice by modulating translocator protein (18kDa, TSPO). *Pharmacogn Mag.* 2022;18(78).
69. Banerjee R, Hazra S, Ghosh AK, Mondal AC. Chronic administration of bacopa monniera increases BDNF protein and mRNA expressions: a study in chronic unpredictable stress induced animal model of depression. *Psychiatry Investig.* 2014;11(3):297.
70. Kumar A, Singh A. Protective effect of St. John's wort (*Hypericum perforatum*) extract on 72-hour sleep deprivation-induced anxiety-like behavior and oxidative damage in mice. *Planta Med.* 2007;73(13):1358-64. doi: 10.1055/s-2007-981551
71. Lelong C, Ris L, Sytar O, Defrère S, Villers A. *Rhodiola rosea* roots powder strongly reduces anxiety and corticosterone level induced by chronic stress in a murine model. *SSRN.* 2024. doi: 10.2139/ssrn.5235890
72. Mirowska-Guzel D, Widy-Tyszkiewicz E. Effect of *Passiflora incarnata* L. extract on exploratory behaviour and neurotransmitters level in structures involved in motor functions in rats. *J Pre-Clin Clin Res.* 2024;18(1):1-10. doi: 10.26444/jpccr/174163
73. Shallvi MM, Saruchi APS, Singh AP. Evaluation of ethanolic extract of *Piper methysticum* leaves on anxiolytic activity of mice. *J Drug Deliv Ther.* 2024;14(11). doi: 10.22270/jddt.v14i11.7080
74. Sasaki K, Ferdousi F, Fukumitsu S, Kuwata H, Isoda H. Antidepressant-and anxiolytic-like activities of *Rosmarinus officinalis* extract in rodent models: involvement of oxytocinergic system. *Biomed Pharmacother.* 2021;144:112291. doi: 10.1016/j.biopha.2021.112291
75. Um MY, Yoon M, Lee J, Jung J, Cho S. A novel potent sleep-promoting effect of turmeric: Turmeric increases non-rapid eye movement sleep in mice via histamine H1 receptor blockade. *Mol Nutr Food Res.* 2021;65(14):2100100. doi: 10.1002/mnfr.202100100
76. Alzeer J. Integrating medicine with lifestyle for personalized and holistic healthcare. *J Public Health Emerg.* 2023;7. doi: 10.21037/jphe-23-71



## Journal of Advanced Pharmaceutical Sciences and Natural Products

77. Amiri S, Mahmood N, Javaid SF, Khan MA. The effect of lifestyle interventions on anxiety, depression and stress: a systematic review and meta-analysis of randomized clinical trials. *Healthcare*. 2024 Nov;12(22):2263. doi: 10.3390/healthcare12222263
78. Manger S. Lifestyle interventions for mental health. *Aust J Gen Pract*. 2019;48(10):670-3. doi: 10.31128/AJGP-05-19-4932
79. Dale H, Brassington L, King K. The impact of healthy lifestyle interventions on mental health and wellbeing: a systematic review. *Ment Health Rev J*. 2014;19(1):1-26. doi: 10.1108/MHRJ-05-2013-0016
80. Alamgir ANM. Herbal drugs: their collection, preservation, and preparation; evaluation, quality control, and standardization of herbal drugs. In: *Therapeutic Use of Medicinal Plants and Their Extracts: Volume 1: Pharmacognosy*. Cham: Springer International Publishing; 2017. p. 453-95. doi: 10.1007/978-3-319-63862-1\_1
81. Parveen A, Parveen B, Parveen R, Ahmad S. Challenges and guidelines for clinical trial of herbal drugs. *J Pharm Bioallied Sci*. 2015;7(4):329-33. doi: 10.4103/0975-7406.168035
82. Fasinu PS, Bouic PJ, Rosenkranz B. An overview of the evidence and mechanisms of herb–drug interactions. *Front Pharmacol*. 2012;3:69. doi: 10.3389/fphar.2012.00069
83. Zhang J, Wider B, Shang H, Li X, Ernst E. Quality of herbal medicines: challenges and solutions. *Complement Ther Med*. 2012;20(1-2):100-6. doi: 10.1016/j.ctim.2011.12.008
84. Shetti S, Kumar CD, Sriwastava NK, Sharma IP. Pharmacovigilance of herbal medicines: current state and future directions. *Pharmacogn Mag*. 2011;7(25):69. doi: 10.4103/0973-1296.80666
85. Verma S, Singh SP. Current and future status of herbal medicines. *Vet World*. 2008;1(11):347.