

Review Article

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ADAPTOGENIC ROLE OF CLASSICAL RASAYANA DRUGS IN COMBATING STRESS AND ANXIETY: AN INTEGRATIVE AYURVEDIC–MODERN REVIEW

*Dr Shweta Raghuwanshi¹, Dr. Priyanka Sharma², Dr Monika Choudhary³

¹Associate Professor, Department of Kayachikitsa, R N Kapoor Memorial Ayurvedic Medical College & Hospital, Indore, MP

²Associate Professor, Department of Kayachikitsa, Shubhdeep Ayurvedic Medical College & Hospital, Indore, MP

docpri22@gmail.com

³Professor, Department of Prasuti Tantra Evam Stree Rog, Veena Vadini Ayurvedic Medical College, Bhopal, MP

PhD Sch, Mahatma Gandhi Ayurvedic College, Wardha, Maharashtra

drmoni2609@gmail.com

*Corresponding Author's Email ID: drshweta.ayu@gmail.com

1. Introduction

Stress has emerged as one of the most pervasive determinants of health in contemporary society. Rapid urbanization, occupational pressures, sedentary lifestyles, sleep deprivation, digital overexposure, dietary irregularities, and psychosocial challenges have collectively increased the prevalence of stress-related mental health disorders such as anxiety, depression, mood disturbances, burnout, and cognitive impairment [1,2]. Chronic stress contributes to neuroendocrine dysregulation via sustained activation of the hypothalamic–pituitary–adrenal (HPA) axis, resulting in altered cortisol rhythms, oxidative stress, mitochondrial dysfunction, low-grade inflammation, and immune imbalance [3,4]. These maladaptive changes predispose individuals to metabolic syndrome, cardiovascular disease, immune dysfunction, neurodegeneration, and premature aging.

Conventional pharmacological approaches (anxiolytics, antidepressants, hypnotics) provide symptomatic relief but are associated with adverse effects, dependency, tolerance, and

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relapse after discontinuation [5]. This highlights the need for safe, long-term, resilience-oriented strategies that restore homeostasis rather than merely suppress symptoms. The concept of adaptogens has gained prominence as a preventive and adjunctive therapeutic class that enhances non-specific resistance to stress and normalizes physiological functions [6].

Ayurveda conceptualizes health as dynamic equilibrium among Dosha, Dhatu, Agni, and Ojas. Stress-related pathology is understood as Dosha imbalance, Agni dysfunction, Srotorodha (microchannel obstruction), and depletion of Ojas. Rasayana therapy, one of the eight classical branches of Ayurveda, is designed to rejuvenate tissues, enhance immunity (Vyadhikshamatva), promote cognition (Medha, Smriti), and preserve vitality. The conceptual parallels between Rasayana and adaptogens suggest a meaningful integrative framework for resilience-based preventive medicine [7,8]. This review synthesizes classical Ayurvedic descriptions with contemporary evidence to position Rasayana drugs as adaptogens in combating stress and mental health disorders.

2. Concept of Adaptogens (Modern Perspective)

Adaptogens are defined as natural substances that enhance non-specific resistance to physical, chemical, and biological stressors; exert a normalizing influence on physiological functions; and demonstrate safety for long-term use [6,9]. Unlike stimulants or sedatives, adaptogens act bidirectionally to restore homeostasis. The biological basis of adaptogenic action centers on regulation of the HPA axis and sympathoadrenal system, stabilization of cortisol rhythms, and modulation of stress mediators [3].

At the cellular level, chronic stress increases reactive oxygen species, lipid peroxidation, and mitochondrial dysfunction. Adaptogens enhance endogenous antioxidant enzymes (SOD, catalase, glutathione peroxidase), preserve mitochondrial membrane potential, and support ATP synthesis, thereby improving fatigue resistance and metabolic resilience [10]. Immunomodulatory actions include normalization of cytokine profiles and enhancement of innate immune surveillance, which is compromised during prolonged stress. Neuroprotective and nootropic effects support neuroplasticity and neurotransmitter balance (GABA, serotonin, dopamine), improving attention, memory, and emotional regulation.

Clinically, adaptogens are explored for burnout, chronic fatigue, anxiety, mild depression, and stress-related somatic disorders, with favorable safety profiles for long-term preventive use.

3. Rasayana in Ayurveda

Rasayana derives from 'Rasa' (primary nourishing fluid) and 'Ayana' (pathways), indicating optimization of tissue nutrition and circulation. Classical texts describe Rasayana as promoting longevity (Dirghayu), cognition (Medha, Smriti), strength (Bala), complexion (Varna), and disease resistance (Vyadhikshamatva) [7,8]. Rasayana therapy includes Kamyas (health-promoting), Naimittika (disease-specific), and Ajasrika (daily dietary rejuvenatives). Achara Rasayana emphasizes ethical conduct, emotional balance, adequate sleep, and harmonious social behavior, underscoring psychosocial hygiene in resilience. Mechanistically, Rasayana operates through Agni Deepana (metabolic optimization), Dhatu Poshana (tissue nourishment), Srotoshodhana (microchannel clearance), and Ojas Vardhana (augmentation of vitality and immunity). Impaired Agni leads to Ama formation and Srotorodha, compromising tissue nutrition and resilience. Rasayana corrects these foundations to restore Samya Avastha (homeostasis). In the context of aging, Rasayana delays Dhatu kshaya and preserves functional reserve, aligning with contemporary concepts of oxidative stress reduction, mitochondrial preservation, and inflammaging attenuation.

4. Correlation Between Rasayana and Adaptogen Concepts

Both Rasayana and adaptogens emphasize resilience, homeostasis, and non-specific enhancement of adaptive capacity. Adaptogenic regulation of the HPA axis parallels Ayurvedic balance of Prana Vata (neuroendocrine signaling), Sadhaka Pitta (emotional and cognitive processing), and Tarpaka Kapha (neuroprotection and nourishment). Chronic stress vitiates Doshas, disrupts Agni, obstructs Srotas, and depletes Ojas, resulting in reduced Vyadhikshamatva. Rasayana restores Samya Avastha through multi-target rejuvenation, analogous to adaptogenic normalization across neuroendocrine-immune-metabolic networks. Anti-fatigue and anabolic effects correspond to Balya/Brimhana properties, while neuroprotective actions align with Medhya Rasayana. This integrative mapping strengthens the translational bridge between Ayurveda and modern stress biology.

Table 1. Comparison of Adaptogen vs Rasayana Concepts

Aspect	Adaptogen (Modern)	Rasayana (Ayurveda)
Goal	Stress resilience	Longevity & immunity
Core Target	HPA axis, CNS, immunity	Dosha–Dhatu–Agni–Ojas
Mechanism	Cortisol modulation, antioxidant	Agni deepana, Ojas vardhana
Role	Prevent stress disorders	Prevent disease & aging
Examples	Ashwagandha, Ginseng	Ashwagandha, Guduchi

Figure 1. HPA Axis and Ayurvedic Correlation in Stress and Homeostasis

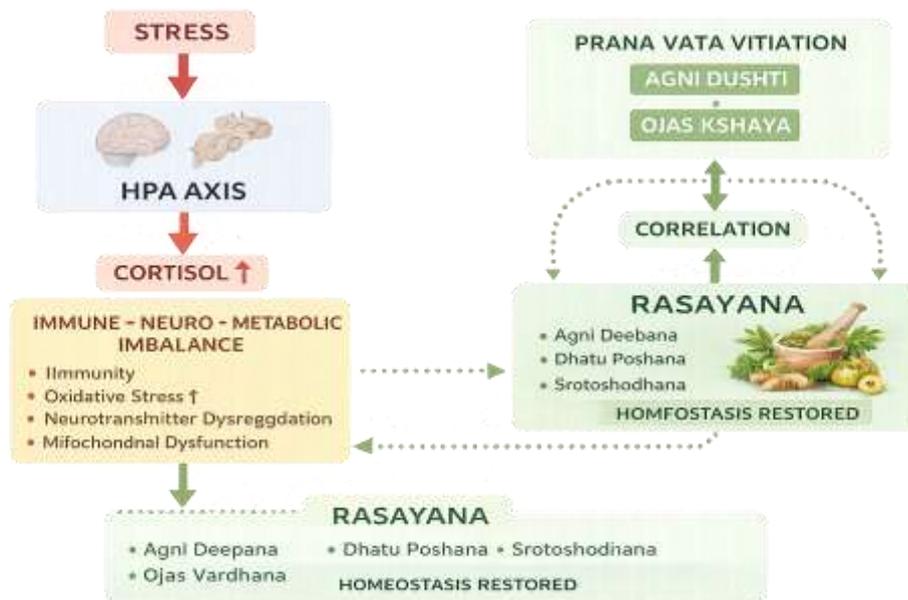


Figure 1. HPA axis and Ayurvedic correlation in stress and homeostasis. Stress activates the hypothalamic–pituitary–adrenal axis resulting in elevated cortisol and neuro–immune–metabolic imbalance. The Ayurvedic correlate involves Prana Vata vitiation, Agni dushti, and Ojas kshaya. Rasayana therapy restores homeostasis through Agni deepana, Dhatu poshana, Srotoshodhana, and Ojas vardhana.

5. Rasayana Drugs with Adaptogenic Potential

Ashwagandha (*Withania somnifera*) is classically Balya, Brimhana, and Medhya Rasayana; it reduces cortisol, improves sleep and anxiety, and enhances stress tolerance [11,12]. Guduchi

(*Emblica officinalis*) enhances Vyadhikshamatva, shows immunomodulatory and anti-inflammatory effects, and supports detoxification [13]. Amalaki (*Emblica officinalis*) nourishes all Dhatus and provides potent antioxidant neuroprotection [14]. Haritaki (*Terminalia chebula*) supports Agni, clears Srotas, and modulates the gut-brain axis, indirectly enhancing stress resilience [15]. Shatavari (*Asparagus racemosus*) nourishes tissues, supports endocrine balance, and improves stress tolerance [16]. Brahmi (*Bacopa monnieri*) and Mandukaparni (*Centella asiatica*) are Medhya Rasayanas that enhance cognition and neuroplasticity [17,18]. Jatamansi (*Nardostachys jatamansi*) exhibits anxiolytic and antidepressant effects [19]. Shankhpushpi and Yashtimadhu (*Glycyrrhiza glabra*) support neuroprotection and stress modulation [20]. The combinatorial use of these Rasayanas reflects Ayurveda's systems-oriented adaptogenic strategy.

Table 2. Rasayana Herbs for Mental Health as Adaptogens

Rasayana Drug	Classical Action	Modern Adaptogenic Action
Ashwagandha	Balya, Medhya	Anti-stress, cortisol ↓
Brahmi	Medhya Rasayana	Memory, anxiolytic
Mandukaparni	Medhya	Neuroprotective
Jatamansi	Manas shamak	Anxiolytic
Guduchi	Rasayana	Immunomodulatory
Amla	Rasayana	Antioxidant
Yashtimadhu	Vata-Pitta shamak	Neuroprotective

6. Discussion

This integrative review demonstrates that classical Rasayana drugs satisfy core adaptogenic criteria via pleiotropic mechanisms: HPA axis modulation, antioxidant defense, mitochondrial support, neurotransmitter balance, and immunoregulation. These network-level effects align with Ayurveda's Agni-Dhatu-Srotas-Ojas framework, emphasizing restoration of systemic balance over single-target intervention. Clinically, Rasayana-based adaptogens may complement conventional care in anxiety, depression, burnout, and stress-related psychosomatic disorders. Limitations include heterogeneity of formulations,

variability in extract standardization, small sample sizes in trials, and limited head-to-head comparisons. Future work should adopt standardized preparations, validated biomarkers (cortisol rhythms, cytokines, oxidative stress indices), and integrative diagnostics (Prakriti, Agni, Ojas) within randomized controlled designs.

7. Conclusion

Rasayana therapy represents a traditional systems-medicine framework of adaptogenesis. Evidence supports the adaptogenic potential of multiple Rasayana drugs for stress resilience and mental health. Standardization, high-quality trials, and systems biology approaches are required to translate this integrative paradigm into evidence-based preventive and clinical practice.

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