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Review Article

Rasayana Kalpana

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The Role of Rasayana Kalpana in Immunomodulation: A Scientific and Ayurvedic Review

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Rasayana (rejuvenation) therapy in Ayurveda is traditionally prescribed to enhance Ojas (vital essence) and Vyadhikshamatva (disease-resistance). This review synthesizes classical Ayurvedic doctrine and modern clinical studies on Rasayana drugs and formulations with immunomodulatory effects. Ayurvedic texts (e.g. Charaka Samhita describe Rasayanas as Ojovardhaka (promoters of Ojas) that impart Vyadhikshamatva. Modern research has identified immune- enhancing activities of key Rasayana herbs. For example, Ashwagandha and Guduchi have been shown to raise antioxidant enzyme levels (↑SOD, ↓MDA) and modulate cytokines and immune cell profiles in human trials. Clinical studies also report symptom improvements in immunocompromised patients using Tinospora cordifolia extract. Emblica officinalis (Amalaki), rich in vitamin C and polyphenols, exhibits antioxidant and anti-inflammatory properties useful in immune defense. Traditional Rasayana preparations like Chyawanprash (containing Amalaki, Ashwagandha, etc.) have demonstrated immunostimulatory effects (e.g. enhanced NK cell activity and cytokine release) in clinical studies. This review underscores that Rasayana Kalpana (formulations) act via antioxidant, adaptogenic and immunoadjuvant mechanisms, supported by both classical texts and modern evidence, to modulate and strengthen host immunity.

Keywords: Rasayana, Ayurveda, Immunity, Guduchi, Ashwagandha

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Introduction

In Ayurveda, *Rasayana* therapy is one of the eight branches (*Ashtanga Ayurveda*), specializing in nutrition, rejuvenation and immune enhancement. *Rasayanas* are defined as measures that enrich the body's tissues, retard aging, and prevent disease. Classic texts emphasize that *Rasayana* substances are *Ojovardhaka* ("promoters of *Ojas*") and impart *Vyadhikshamatva* (immunity). The innate ability to resist disease (*Vyadhikshamatva)* is considered a marker of health in *Ayurveda*. *Charaka* observes that as long as the body's natural strength is intact, disease cannot manifest. Therefore, bolstering *Bala (*strength) and *Ojas* is a central goal of *Rasayana* therapy. In modern terms*, Rasayana* treatment can be viewed as immunomodulation – non-specific enhancement of host defense – achieved through nutrient-rich herbs and formulations. This review examines how *Rasayana Kalpana* (preparations) modulate immune function, drawing on Ayurvedic doctrine (e.g. *Charaka Samhita,*[1] *Sushruta Samhita*) and contemporary clinical research. Key *Rasayana* herbs such as *Guduchi, Ashwagandha* and *Amalaki* are highlighted, including their observed effects on immune markers in human studies.

Materials and Methods

Relevant *Ayurvedic* classical sources (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya* & commentaries) were reviewed for concepts of *Rasayana, Ojas,* and *Vyadhikshamatva*. A literature search was conducted in PubMed, Google Scholar and Ayurveda journals for keywords *"Rasayana"*, "immunity"*, "Tinospora cordifolia",*[2] *"Withania somnifera",*[4] *"Emblica officinalis"*, and related terms.

Studies reporting immune or antioxidant outcomes were selected, including randomized trials & observational studies on *Rasayana* herbs & formulations. We also consulted recent review articles and JAIMS (Journal of Ayurveda and Integrative Medicine Sciences) publications. The objective was to integrate classical Ayurvedic theory with modern evidence on immunomodulation by *Rasayana Kalpanas.*

Discussion

Ayurvedic Concepts of Immunity and Rasayana

Ayurveda recognizes an inherent host defense - *Vyadhikshamatva* - that preserves health*.* *Charaka* defines *Vyadhikshamatva* as body's innate power to repel disease. This includes both *Sahaja Bala* (innate strength, akin to genetic/innate immunity) & *Yuktikrita Bala* (acquired strength, analogous to adaptive immunity acquired by nourishment or therapy). *Rasayana* therapy is specifically prescribed to augment these strengths. The *Rasayana Adhyaya* (Chapter) of *Charaka Samhita* states that *Rasayana* is the means of obtaining the best qualities of body tissues and is able to defeat aging and disease. "*All Rasayanas* are *Ojovardhaka* (promoters of Ojas, the essence of vitality) thereby imparting *Vyadhikshamatva (*immunity) in the body". In other words, *Rasayana* herbs increase *Ojas* (vital essence or immune vigour) & *Bala* (strength), thus enhancing resistance to pathogens.

In classical texts, many *Rasayana* plants are noted for immune-related effects. For example, *Tinospora cordifolia*[2] (*Guduchi,* also called *Amrita* or "nectar") is described as *Rasayana, Balya* (strength-promoting) and *Jwarahara* (antipyretic). *Acharyas* attribute to *Guduchi* the power to promote youth, vitality and longevity (hence the name *Amrita*). Similarly*, Withania somnifera*[4] (*Ashwagandha*) is a classical *Medhya Rasayana* (nervine tonic) also valued as an adaptogen that reduces stress and promotes strength*. Emblica officinalis* (*Amalaki*), rich in vitamin C, is a cornerstone *Rasayana;* it balances the *Doshas* and is traditionally used to treat respiratory infections. These classical insights align with modern concepts: *Rasayanas* are "immunomodulatory", meaning they modulate both innate and adaptive responses to enhance host defense.

Mechanisms of Immunomodulation by *Rasayana Kalpana*

Rasayana herbs and formulations exert multiple synergistic actions on immune system & antioxidant status. Key mechanisms supported by modern studies include;

- **Antioxidant activity:** Many *Rasayanas* are rich in polyphenols, flavonoids, and vitamins. For example, *Ashwagandha* and *Guduchi* have been shown to significantly increase superoxide dismutase (SOD) levels & decrease malondialdehyde (MDA, a marker of oxidative stress) in healthy volunteers. By neutralizing free radicals, *Rasayanas* protect immune cells from oxidative damage. Amalaki fruit provides high vitamin C, gallic acid and tannins, acting as a potent antioxidant.

- **Immune cell enhancement:** *Rasayana* formulations can increase immune cell counts and activity. In one randomized trial, healthy adults receiving Ashwagandha extract showed significant rises in immunoglobulins (IgA, IgM, IgG subclasses) and T-lymphocyte subsets ($CD4^+$, $CD8^+$, $CD45^+$) compared to placebo. In the same study, Ashwagandha markedly increased cytokine levels (IFN-γ, IL-4) indicative of balanced Th1/Th2 responses. These findings suggest that Withania enhances both innate (e.g. NK cells) and adaptive immunity.
- **Cytokine modulation:** *Rasayana* compounds may modulate cytokine profiles toward protective *Chyawanprash***[8]**, a classical *Rasayana* preparation containing *Amalaki, Ashwagandha, Guduchi* and other herbs, was shown to boost inflammatory mediators in vitro: treatment of immune cells with *Chyawanprash* increased secretion of TNF-α, IL-1β and MIP-1α and enhanced natural killer (NK) cell activity. In animal models, *Chyawanprash* pretreatment reduced plasma histamine and serum IgE release in allergy challenges, indicating antiallergic immune modulation. Overall, these studies demonstrate *Chyawanprash*'s immunostimulatory effect on innate immunity and cytokine release.
- **Immunoadjuvant/adaptogenic effects:** Many *Rasayana* herbs act as adaptogens, helping the body resist stress. By reducing stress hormones (e.g. cortisol) and improving energy metabolism, they indirectly support For instance, clinical use of *Chyawanprash* was associated with decreased cortisol levels and improved quality of life. *Ashwagandha* is well-known as a stress reducer, which can preserve immune function under stress.
- **Nutritional support of *Dhatus* and *Agni*:** In Ayurveda, optimal digestion/metabolism (*Agni*) and balanced tissues (*Dhatus*) are foundational for immunity. *Rasayana Kalpana* often include nourishing vehicles (e.g. *ghee*, milk) & nutrient-rich herbs that improve *Agni* and replenish *Dhatus*. This holistic effect is seen as enhancing *Srotas* (microcirculation) and tissue nutrition, which in turn augment *Ojas*. These mechanisms suggest that *Rasayana Kalpanas* work as multimodal immunomodulators. An integrated view posits that the combination of antioxidant phytoactives, immune-enhancing phytoconstituents and nourishing formulations synergistically heightens host defense.

Selected *Rasayana* Agents and Immunomodulation

Tinospora cordifolia* (*Guduchi)

Guduchi is a prime *Rasayana* in *Ayurveda*, revered for its *Balya* (strengthening), *Rasayana* (rejuvenative) and *Jwarahara* (antipyretic) qualities. The plant's *Sanskrit* name means "one which protects the entire body," reflecting its panacea-like status. *Ayurvedic* commentators call it *Amrita,* indicating its life-restorative effects.

Modern analyses have identified immunologically active compounds in *Guduchi,* including alkaloids (magnoflorine, berberine), diterpenoid lactones and polysaccharides. These constituents exhibit pronounced immunostimulatory activity in vitro and in vivo. For example, polysaccharides from T. cordifolia activate macrophages and dendritic cells, and upregulate nitric oxide and cytokines. Clinical and experimental studies corroborate *Guduchi's* immune benefits. A randomized, placebo-controlled trial in HIV-positive patients found that *Tinospora* extract significantly alleviated symptoms and improved quality of life. Although not all hematological indices changed, 60% of treated patients reported reduced disease- related complaints (versus 20% on placebo). This suggests a general immunostimulant effect. In models of allergic rhinitis, *Guduchi* extract reduced eosinophil counts and IgE levels while enhancing respiratory function (Badar et al., 2005). Importantly*, Guduchi* is generally well-tolerated with no major adverse effects reported in human studies. In summary*, Guduchi's* traditional role as *Rasayana* and its rich phytochemistry support its characterization as an immunomodulator. It is credited with strengthening *Ojas* and protecting against infections. Modern research confirms that *Guduchi* enhances innate immune cell function and can serve as an adjunct to improve host resistance.

Withania somnifera (Ashwagandha)

Ashwagandha is classically prized as a *Medhya Rasayana* (intellect-promoting) and adaptogen. Ayurvedic texts list it among key *Rasayana* herbs for vitality and longevity. It contains steroidal lactones called withanolides (e.g. withaferin A) which have anti-inflammatory and stress-reducing properties. Recent trials demonstrate clear immunomodulatory actions of *Ashwagandha.* In a randomized, double-blind study of healthy volunteers, 60 mg/day standardized *Ashwagandha* extract for 30 days significantly increased levels of serum immunoglobulins (IgA, IgM, IgG1-4), T lymphocyte subsets ($CD3^+$, $CD4^+$, $CD8^+$, $CD19^+$ B cells, $CD45^+$ pan- leukocytes), and cytokines (IFN-γ, IL-4) compared to placebo. Placebo-treated controls actually showed declines in some immune markers, whereas the *Ashwagandha* group showed strong improvements. During an open-label extension, subjects crossing over to Ashwagandha also exhibited significant immune gains.

No adverse events were reported. *Ashwagandha* also exhibited significant immune gains. No adverse events were reported. The authors concluded that *Withania* extract "significantly improved the immune profile of healthy subjects by modulating the innate and adaptive immune systems". Other studies support *Ashwagandha's* immunopotentiating effects. An Ayurvedic combination of *Terminalia chebula* and *Withania* (LN20189) showed enhanced phagocytic and T- cell functions in adults (pilot RCT, 2021). Preclinical work indicates that withanolides may modulate NF-κB and MAPK pathways in immune cells. Additionally*, Ashwagandha's* stress-protective (cortisol-lowering) actions indirectly support immunity.

In short, *Ashwagandha* provides both specific and non-specific immune benefits – from elevating immunoglobulins and cytokines to mitigating stress-related immune suppression. Its classical *Rasayana* role as a body- strengthening tonic is now substantiated by evidence of enhanced host defense.

Emblica officinalis (Amalaki)

Amalaki (Indian gooseberry) is one of *Ayurveda's* most important *Rasayanas. Charaka* repeatedly extols *Amalaki* for its *Rasayana* & *Vyadhihara* properties. It is extremely rich in vitamin C (ascorbic acid) and polyphenols (gallic acid, ellagitannins). These constituents confer potent antioxidant effects, helping maintain immune cell integrity. Traditional texts group *Amalaki* in formulas for recurrent respiratory and ENT infections (tonsillitis, sinusitis, cough). Its astringent & *Tridosha*-balancing nature is said to remove excess mucus and inflammation.

Modern studies echo its immune-supportive profile. In cell and animal models, Emblica extracts enhance lymphocyte proliferation, macrophage activity and antibody responses, while lowering inflammatory cytokines. One study on arsenic- induced immunosuppression in mice found that *Amalaki* fruit extract restored thymocyte counts and reduced apoptosis (immunoprotection). Clinically, *Amalaki* - containing formulations have demonstrated immune benefits. A double-blind trial of *Chyawanprash* (with *Amalaki* as the base) in children reported significant improvements in measures of immunity and energy. In this 6-month study, *Chyawanprash* users showed higher scores on a validated pediatric quality-of-life index reflecting vigor and immunity than controls. Another RCT found that daily intake of *Emblica officinalis* fruit powder reduced serum markers of oxidative stress and improved endothelial function, both relevant to immune health (Kapoor et al., 2019).

Together, these findings suggest that *Amalaki's* antioxidant and anti-inflammatory properties translate into tangible immunomodulatory effects. By neutralizing free radicals & supporting mucosal defenses, it fortifies the body's resistance to infections. In Ayurvedic terms, *Amalaki* enhances Ojas and Dhatu quality, thus enhancing overall immunity.

Rasayana Kalpana **(Formulations) in Immunomodulation**

In practice*, Rasayana* therapies often involve complex *Kalpanas* (formulations) designed to maximize efficacy. A quintessential example is *Chyawanprash***[8]**, a herbo-fruit jam primarily composed of *Amalaki* plus ~40 other herbs including *Guduchi* and *Ashwagandha*. *Chyawanprash* is classically prescribed for pediatric and geriatric immunity. Modern analyses validate its immune activity: multiple clinical studies report that regular *Chyawanprash* intake boosts natural immunity. For instance, *Chyawanprash* treatment enhanced NK cell activity and phagocytosis in vitro, and significantly reduced allergy markers (IgE) while improving overall immune markers (C3, C4 complement, pulmonary function) in human subjects. Another trial in children showed *Chyawanprash* significantly increased anthropometric indices and subjective immunity/vitality scores over 6 months. These outcomes underscore that multi-herb *Rasayana* preparations can act as broad- spectrum immunomodulators, leveraging the synergistic actions of their ingredients. In addition to *Chyawanprash*, other *Rasayana Kalpanas* (e.g. *Triphala, Brahma Rasayana* decoctions, medicated *Ghritas*) are reputed to enhance resistance and are under study for immune effects.

Synergy of Traditional and Modern Evidence

The convergence of classical *Ayurvedic* knowledge with contemporary science strengthens the case for *Rasayana* in immunity. Ayurveda's concept of *Vyadhikshamatva* maps well onto modern immunity, and the description of *Rasayanas* as *Ojovardhaka* (immunity-boosting) finds parallel in immunomodulatory research.

Modern phytochemical studies reveal that *Rasayana* herbs contain multiple bioactive constituents (e.g. polyphenols, steroids, alkaloids) with documented effects on immune cells and inflammation. Clinical data, though still limited, increasingly show *Rasayana* interventions improving immune parameters in humans.

The compiled evidence indicates that *Rasayana Kalpa-nas* modulate immunity through antioxidant defense, direct immune cell stimulation, and systemic strengthening of the body (enhanced *Bala* and *Ojas*).Given the low toxicity and broad-spectrum actions of these herbs, they are attractive as adjuncts to conventional immunity management. However, more rigorous clinical trials are needed. Future research should isolate active molecules, delineate molecular targets, and standardize formulations. Nonetheless, this review highlights that the *Ayurveda*-origin concept of *Rasayana* as immunomodulators is supported by scientific observations and can inform integrative approaches to health

Conclusion

Rasayana Kalpana – Ayurvedic rejuvenative therapies – play significant role in modulating immune system. Classical sources explicitly link *Rasayana* use to enhanced *Ojas* & *Vyadhikshamatva*. Modern research confirms that key Rasayana drugs**[3]** (*Tinospora, Withania, Emblica*, etc.) exhibit immunostimulant, antioxidant and adaptogenic effects. Clinical studies in humans have demonstrated improvements in immune markers (immunoglobulins, cytokines, immune cell counts) and clinical symptoms after *Rasayana* interventions. Traditional multi-herb preparations like *Chyawanprash***[8]** also show immune-boosting benefits in trials. Together, the evidence supports the integration of *Rasayana Kalpana* into strategies for enhancing immunity and preventing infection. Leveraging this ancient science in conjunction with modern medicine may offer a valuable resource for addressing immune-related disorders.

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