

## Exploring immunomodulatory effect of Guduchi Mulathi and Tulasi in children: A Review

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### ABSTRACT-

Herbal medicine has gained significant attention for its potential role in enhancing immunity. This review explores the mechanisms through which various herbs exert immunomodulatory effects, highlighting their impact on key immune components. From adaptogenic herbs regulating stress response to plants rich in antioxidants combating oxidative stress, the diverse array of herbal remedies contributes to a holistic approach in supporting immune function. Understanding the immunomodulatory properties of specific herbs can pave the way for targeted integrative approaches in healthcare, promoting a balanced immune system. The herbal drugs has very importance in enhancing the immunity and longevity of the human. They are also very useful in protective from infection drugs such as Guduchi, Mulathi, Tulasi etc.

**Keywords**– Immunity , Guduchi , Mulathiand Tulasi.

### I. INTRODUCTION –

Immunity is the biological term that describe a state having sufficient biological defences to avoid infection disease or another unwanted biological invasion . Health the equilibrium state of Dhatu, Dosh and Mala<sup>1</sup>. Charak has also described Bala as the factors that destroys the Doshas or disease causing factor .Balam Hyalam Dosaharam Nigrahaya Dosanam<sup>2</sup>. Bala are synonyms Prana and Oja and Oja appeared for most in the human body during embryogenesis. Saptadhatu sar is called Oja. It is the throne of power, hence known as Bala<sup>3</sup>. Guduchi (T.cordifolia), Mulathi (Glycyrrhizaglabra) and Tulasi (Occimum sanctum) are revered in traditional medicine for their potential roles in enhancing immunity. These herbs have been historically recognised for their diverse medicine properties including immunomodulation as the world explores complementary approaches

to support health, understanding the contribution of these botanical to the immune system is growing interest.

1. Guduchi (Tinospora cordifolia)-known as Amrita in Ayurveda, Guduchi celebrated for its immunomodulatory effects. It is believed to stimulate immune cells, helping the body respond effectively pathogens. Rich in antioxidant , Guduchi may contribute to overall immune system balance and resilience.

2. Mulathi (Glycyrrhizaglabra )-It has been used for centuries as traditional Medicine for its anti-inflammatory and immunomodulatory properties. Glycyrrhizin a key components may influence immune response and contribute system regulation. Licorice is often employed to support the respiratory and immune system.

3. Tulasi (Occimum sanctum)- Tulasi is considered a sacred herb in many cultures and is valued for its medicinal properties. It possesses antimicrobial properties and may contribute to the body's defense against infections. With adaptogenic qualities, Tulasi may help the immune system adapt to stressors.

### Understanding the Immunomodulatory Role of Guduchi, Mulathi and Tulasi in Children.

**Guduchi**- It is also called Giloy and Amrita. It's botanical name is Tinospora cordifolia. The leaves of Guduchi is heart shaped . Guduchi has Tiktha Kashaya Rasa ,Guru Guna , Madhura Vipaka ,Ushana Virya effect thus provide immunomodulatory action. It has long been used and recommended in Indian medicine. The root and stem of Giloy are used in therapeutic purpose. It protects the life because of its rejuvenating property and also responsible for longevity . It removes the toxins. The presence of an immunomodulatory protein in the Guduchi stem, known for its lymphoproliferative and macrophage-activating properties, reinforces the scientific basis for

leveraging Guduchi preparations in immunomodulation.

Guduchi Katuka Tikta Swadupaka Rasayani Sangharahni Kayhayausnalaghavi Balyaagnidipni<sup>4</sup>.

Guduchyaayuyaprda Medha Tikta Sangrahni BalaJawar Trata Pandu Vataasarak Chardi Meha Tridoshjit<sup>5</sup>.

Guduchi Madhura Paka Kasya Katuka Laghu Tikta Sangrahni Hardya Balayo Ushna Vihnikriyat<sup>6</sup>.

**Pharmacological aspects-** The major biological activities of *T. cordifolia* include spasmolytic, allergen-free and anti-diabetic properties. Additionally, its root is known for stress relief and antimalarial effects, while the stem serves as a bitter stomachic and diuretic. The plant stimulates biliary secretion, enriches the blood and is believed to have a positive impact on the immune system, aiding in the treatment of jaundice.

**Immunomodulatory activity-** Isolated chemical compounds like cordifolioside A and syringin from Guduchi are reported as immunomodulating agents in clinical studies. The stem of *T. cordifolia* influences enzyme levels, such as catalase, and stimulates lymphocyte cells, maintaining immune strength and emphasizing the immuno-protective role of this plant. Exposure of macrophage cells to *T. cordifolia* extract increases the production of enzymes, including 'myeloperoxidase,' enhancing anti-microbial action to protect immunity. Moreover, it boosts phagocytic activity, stimulates splenocytes and macrophages, leading to enhanced nitric oxide production, signifying and immuno-protective activity.

**Guduchi formulation**

| S.no. | Guduchi formulations | Indications                             | Pharmacological activity                  |
|-------|----------------------|---|---|
| 1.    | Guduchi Swarasa      | Medhyarasayana, kamla, jeernajwara etc. | MedhyaRasayana, anti - microbial activity |
| 2.    | Churna               | Rajyakshma                              | Anti microbial activity, rasayan          |

**Anti-oxidant activity** -Various extracts of *T. cordifolia* demonstrate antioxidant potential by scavenging free radicals and other reactive species. In a diabetic rat model induced by alloxan, *T. cordifolia* significantly reduces the regulation of lipid peroxidation, leading to a decrease in reactive free radical species. Additionally, it upregulates antioxidant enzymes such as Catalase and glutathione, highlighting its antioxidant effects in combating oxidative stress.

**Anti-toxin activity** -Guduchi exhibits the potential to scavenge free radicals, demonstrating a protective effect by influencing various hormone and mineral levels. *T. cordifolia* is reported to reverse aflatoxin-induced toxicity in the kidney of Swiss albino mice. It significantly elevates hormone levels like glutathione and enhances enzyme activities such as catalase and glutathione reductase, while reducing reactive oxygen species. This anti-toxin activity is attributed primarily to the alkaloids present in the plant. Furthermore, lead nitrate toxicity in Swiss albino Mice leads to a decreased erythrocyte and leucocyte count in blood serum.

**Anti -cancer or Anti-tumor activity** -The anti-cancer activity of Guduchi has been evident in diverse animal models. It not only displays radio-protective effects, elevating tissue and body weight, but also shields against gamma radiation on mice testes. Furthermore, *T. cordifolia* extracts induce dose-dependent cell death in cultured HELA cells. Investigations highlight the hydroalcoholic root extract's capacity to boost Glutathione (GSH) levels, diminish malonaldehyde (MDA) production, and reduce free radical formation, establishing a cellular antioxidative state.

|    |               |                                  |   |
|----|---------------|----------------------------------|---|
| 3. | Ghrita        | Kasa, jeernajwara, mukhroga etc. | Anti pyretic activity, anti stress effect with immunosuppressive activity |
| 4. | Guduchisatava | Rasayana                         | Immuno stimulating activity <sup>7</sup>                                  |

**Mulathi**-It is also called sweetwood or liquorice. Its botanical name is *Glycyrrhiza Glabra*. It has two types 1. Yastimadhu 2. Klitanaka. Yastimadhu has Madhura Rasa, Guru Guna, Shit Virya, Madhura Vipaka.

YastiHima Guru SwadiChaksuyaBalvarnakarata.....<sup>8</sup>  
KlitanamaMaduramRuchyaBalyamVarsyamVarna paham.....<sup>9</sup>

Glycyrrhizin, found in Mulathi contains bioactive compounds like polysaccharides, triterpenes, and flavonoids. These compounds enhance immunity by activating various targets, such as increasing interferon-gamma production, promoting lymphocytic proliferation during viral infections, exhibiting dose-dependent cell-mediated and humoral immunomodulatory activity. Additionally, they significantly increase leukocyte count, phagocytic index, reduce the duration of viral antigen shedding, and elevate serum antibody levels.<sup>10, 11</sup>

immune stimulation. Acetylmuramoyl peptide is glycyrrhizin analogue having potential in vitro immune-stimulating properties.

**Antitussive and Expectorant**-The licorice powder and extract have been found to be beneficial for treating sore throat, cough, and bronchial catarrh due to their antitussive, demulcent, and expectorant properties. These effects are attributed to the presence of glycyrrhizin, which helps to expel congestion in the upper respiratory tract by accelerating tracheal mucus secretion.

**Anticoagulant and Memory Enhancing Activity**-Glycyrrhizin, known for its anti-inflammatory properties, has been identified as the first plant-based inhibitor of thrombin. It extends thrombin and fibrinogen clotting times and prolongs plasma recalcification duration. Additionally, glycyrrhizin inhibits thrombin-induced platelet aggregation, although it does not affect PAF- (platelet aggregating factor) or collagen-induced agglutination.

**Pharmacological aspects –**

**Immunomodulator Activity**-Glycyrrhizaglabra stimulate macrophages and hence elevate and assist

**Mulathiformulation -**

| S.no. | Mulathiformulations | Indications                           | Pharmacological activity          |
|-------|---------------------|---------------------------------------|-----------------------------------|
| 1.    | MulathiTilam        | Inflammation, eczema, dermatitis etc. | Anti allergic property            |
| 2.    | MulathiChurna       | Ulcers, respiratory system            | Anti inflammatory & analgesic     |
| 3.    | MulathiKwatha       | Fever, cough, sore throat etc.        | Anti inflammatory & anti pyretics |
| 4.    | MadhukadiGhrita     | Ksataksina                            | Analgesic action                  |

**Tulasi**-It is also called Washnavi, Holi basil .Its botanical name is *occimum sanctum* . Tulasi has katutiktharasa ,ushnavirya,katuvipaka . It is very common plant grown in all villages. Tulasi can be seen everywhere.It is regarded as the best drug. Tulasi plant is a religious plants in Hindu religion. It has medicinal and therapeutic importance. It is also considered as a goddess.There are two varieties of the Tulasi plant: the black variety, also known as KrishnaTulasi and the green variety, referred to as Rama Tulasi.

Tulasi is known for its immune-boosting properties, aiding the body in defending against foreign particles like bacteria, viruses and fungi. Its use contributes to maintaining a balanced and resilient immune system <sup>12</sup>.Tulasi extract stimulates both cellular and humoral immunity, acting as a potent antioxidant and demonstrating effectiveness against various bacterial strains. Consuming Tulasi leaves on an empty stomach is believed to enhance immunity in children's . Tulasi plays a crucial role in bolstering the body's immune response. It proves valuable in treating diseases and controlling both ecto and endo parasites. Its significance lies in enhancing immunity through the modulation of cytokine secretion, histamine release, immunoglobulin secretion, cellular co-receptor expression, lymphocyte activity, and phagocytosis<sup>13</sup>

**Pharmacology aspect –**

**Immunomodulatory activity** -The steam distilled extract from the fresh leaves of OS displayed

alterations in the humoral immune response in albino rats, implicating mechanisms such as increased antibody production, release of mediators involved in hypersensitivity reactions, and tissue responses to these mediators in target organs. Furthermore, OS seed oil is suggested to impact both humoral and cell-mediated immune responsiveness, with potential involvement of GABAergic pathways in mediating these immunomodulatory effects.

**Analgesic action** -The OS oil was determined to lack analgesic activity in experimental pain models such as the tail flick, tail clip, and tail immersion methods. However, it exhibited effectiveness against acetic acid-induced writhing in mice in a dose-dependent manner. The writhing inhibitory activity of the oil is proposed to be peripherally mediated, attributed to the combined inhibitory effects of prostaglandins, histamine and acetylcholine.

**Antimicrobial effects** -The essential oil in Tulasi exhibits potent antimicrobial effects, showcasing antibacterial, antiseptic and antiviral properties. It effectively inhibits the growth of pathogens such as *E. coli*, *B. anthrax* and *M. tuberculosis*. Extracts from Tulasi significantly reduce the root causes of diseases, as evidenced by scientific indications and the biochemical framework, making it beneficial for individuals with various viral infections.

**Tulasi formulations -**

| S.no. | Tulasi formulations       | Indications                           | Pharmacological activity              |
|-------|---------------------------|---------------------------------------|---------------------------------------|
| 1.    | Surasadikwatha            | Kasa,shwasa,kustha etc.               | Action on the respiratory tract       |
| 2.    | Tulsiswarasaditaila       | Sneezing, running nose, putinasa etc. | Action on the upper respiratory tract |
| 3.    | Tribhuvankirtiras         | Spleen and liver diseases             | Anti inflammatory and analgesic       |
| 4.    | Hingusauvarchaladyaghrita | Seizures, convulsions etc.            | Anticonvulsant activity               |

## II. DISCUSSION –

Guduchi, Mulathi and Tulasi are esteemed for their immune-boosting potential, each contributing unique properties. Guduchi is renowned in Ayurveda for its immunomodulatory effects, enhancing the body's defense mechanisms. Its antioxidant properties help neutralize free radicals, reducing inflammation and supporting immune function. Guduchi is also believed to stimulate the production of white blood cells, crucial for combating infections and bolstering immunity. Mulathi contains glycyrrhizin, known for its anti-inflammatory and antiviral properties, contributing to immune support. It helps soothe respiratory discomfort, making it beneficial for conditions like coughs and colds, thereby indirectly supporting overall immunity. Mulathi's expectorant qualities assist in clearing respiratory passages, promoting respiratory health, which is integral to immunity. Tulasi possesses antimicrobial properties that combat infections and help fortify the immune system. Its adaptogenic nature helps the body adapt to stressors, which can indirectly enhance immune function. Tulasi's antioxidant and anti-inflammatory properties further support immune health by reducing inflammation and oxidative stress. In combination, these herbs offer a holistic approach to immune support, addressing inflammation, oxidative stress, and respiratory health. However, it's essential to consult healthcare professionals for personalized recommendations, especially for children, to ensure safe and effective use.

## III. CONCLUSION –

Guduchi, Mulathi and Tulasi are revered herbs in Ayurveda known for their immune-boosting properties. Their antibacterial, anti-inflammatory, antioxidant and immunomodulatory effects make them beneficial for enhancing immunity in children. However, it's crucial to seek guidance from healthcare professionals for proper dosage and administration, ensuring safe and effective use. Incorporating these herbs into children's diets may support their immune health and overall well-being. In this review, Guduchi, Mulethi and Tulsi act as immunomodulators which promote growth and development and also help to reduce the reoccurrence of frequent infections in children as these kind of frequent infections hampers the overall health of child. It has very harmful effects. Therefore, using Ayurvedic herbs

such as Tulsi, Mulethi and Guduchi strengthens the immunity and thus maintain the well-being of child.

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