

A Review on Safe and Effective Selected Herbs for Common Pediatric Ailments

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Abstract:

The Siddha system of medicine has Kuzhanthai maruthuvam as a branch of Pediatric medicine. This division has most of its formulation based on herbal origin. Even during this modern era, herbs have been used in traditional and folk lore practices based on experience based knowledge and they considered to be safe and time tested.

Newborns and infants are susceptible to gastrointestinal and respiratory disorders. It has been found that nearly 70% of children between birth and 2 years of age, were prescribed at least 1 antibiotic. With most receiving multiple antibiotics exposure in the first 2 years of life is associated with the risk of immunological, metabolic, and neurobehavioral health conditions with childhood onset. Instead use of herbal medicines for minor pediatric issues that are commonly seen can be more beneficial as early exposure to antibiotics have been found to affect the infant microbiota and immunity. In this review some of the commonly used herbs such as Adhatoda vasika, Coleus aromaticus, Tachyspermum ammi, Azadirachta indica, Glycyrrhiza glabra and Piper betle have been selected and scientifically explored for their therapeutic action and safety.

Key Words: Herbs, Pediatrics, Respiratory disorders, Gastrointestinal disorders

1. INTRODUCTION

Off late there has been emerging trend of antibiotic resistance posing a threat, to post-antibiotic era where children will once again die because of simple, previously treatable infections¹. In a previous study that analysed the use of antibiotics among pediatric age groups, it has been found that nearly 70% of children between birth and 2 years of age, were prescribed at least 1 antibiotic, with most receiving multiple antibiotics exposure in the first 2 years of life is associated with the risk of immunological, metabolic, and neurobehavioral health conditions with childhood onset¹. Children are known to receive antibiotics more often

than any other type of drug, as they are frequent subjects of infections of various etiologies, from the more common urinary tract infections, gastrointestinal infections to the less frequent meningitis. The improper use of antibiotics is the most important cause of the modern expansion of antibiotic resistance^{2,3}.

The traditional Siddha medicines has listed a group of common pediatric ailments in its text such as respiratory disorders, gastrointestinal disorders, fever, epilepsy, nutritional disorders, worm infestations, eyes, ear and throat issues along with its subtle symptoms and has also prescribed the herbal and herbomineral formulations to combat these illness. Traditional medicines has a very long history. It is the sum total of the practices based on the theories, beliefs and experiences of different cultures and times, often inexplicable, used in the maintenance of health, as like in the prevention, diagnosis, improvement and treatment of illnesses⁴. The superiority of herbal medicine lies in the fact that natural herbs have potent phytochemicals that has biological properties to enhance the action of immune properties in a person like herbs increase the cytokine expression; increase the activity of CD8 and CD4 T cells, and natural killer cells to fight against infection thereby paving way for natural immunity⁵.

Intestinal Immunity in children and role of herbs

The bacterial communities colonizing the human body play essential roles in the development of host immunity, metabolism, and behavior⁶⁻⁸. Although the causal role of the microbiome is not resolved in humans, murine studies support the hypothesis that microbiome perturbations during key developmental periods have long-lasting health consequences¹. In comparison with adults, antibiotic treatments in infants have disproportionate consequences because the infant microbiota represents an evolving system that is unstable and immature until 2–3 years of age. However, relatively less knowledge is available on how antibiotics affect the infant microbiota and immunity^{2,9}.

To have a better nation, healthy citizens can contribute a lot. The health status of the children, their growth and development at different stages of life, the expected health issues during their childhood and its management, prevention of those obstacles, the way of living are all clearly described in Siddha system in a scientific approach. Specific Siddha drug formulations exclusive for Paediatric usage are given by Siddhars to combat common childhood diseases and disorders. The Text book dealing with Paediatrics in Siddha system is called as “Balavagadam”. “Balavagadam” is the branch of medicine dealing with the diseases of the children and their management & treatment through Siddha system of medicine or care of infants and children through Siddha way.¹⁰ In this review some of the commonly used herbs such as Adhatoda vasika, Coleus aromaticus, Tachyspermum ammi, Azadirachta indica, Glycyrrhiza glabra and Piper betle have been selected and scientifically explored for their therapeutic action and safety.

2. Scientific validation of selected traditional herbs used in pediatrics

1. *Adhathoda vasika* (*Adathodai-TamilName*)

The Malabar nut tree, also known as vasaka, is well-known in India. Its brand name, vasaka, is derived from a Sanskrit name. The leaves also contain the alkaloid vasicine, which is not just a necessary component. In traditional Indian medicine, the Malabar nut (*Adhathoda vasika*) has been used to cure a variety of conditions, including bronchitis, leprosy, blood disorders, heart issues, thirst, asthma, fever, vomiting, memory loss, leucoderma, jaundice, tumours, oral issues, sore eyes, fever, and gonorrhoea. Vasaka is mostly composed of its several alkaloids, of which vasicine is the most significant. The leaves contain two significant alkaloids, vasicine and vasicinone. The herb has an astringent and bitter flavour¹¹. *Adhathoda vasika* is a potent remedy for bronchitis, TB, and other lung and bronchiole issues. Vasaka leaves can be used to make a decoction that can be used to treat cold-related symptoms including coughing. The leaves have a well-earned reputation for being a potent remedy for bronchitis and coughing. It enhances vocal quality and restores kapha and pitta to normal. It is advantageous to the tuberculosis sufferer. In order to cure chronic bronchitis, asthma, and TB, the leaves are mashed and wet. One teaspoon of the juice that results from this process. This doesn't necessarily mean that it always cures certain diseases, but it does offer prompt relief. It eliminates any kapha (phlegm) that has accumulated in the lungs due to its great expectorant characteristics. Vasaka is frequently used for its blood cleansing, expectorant, and antispasmodic qualities¹¹. Vasaka is usually ingested in dosages of 15 to 30 in the form of juice extracted from its leaves and mixed with ginger or honey. The leaves can be consumed as a decoction or as 2 grammes of dry leaf powder. 0.75 to 2 grammes of the powdered root bark and 30 to 60 cc of the decocted bark are supplied in each dose¹².

2. *Coleus aromaticus* (*Karpooravalli-Tamil Name*)

Coleus aromaticus is a plant that has long been used as a traditional herbal treatment. Asthma, eczema, and other allergy diseases have long been treated with *coleus aromaticus* roots and leaves. For children the leaf juice has been indicated for common cold, cough¹⁰. In addition to stabilising the cells that generate histamine and other inflammatory substances, this plant's active ingredients have been proven to lower blood pressure in heart disease patients and relieve intraocular pressure in glaucoma patients¹³. A significant medicinal plant, *Coleus aromaticus*, has been used for a long time to cure asthma without causing any unfavourable side effects. The pharmacological value of *Coleus aromaticus* is due to forskolin, a diterpenoid that was extracted from it. The ability of forskolin to scavenge active oxygen species with the lipid region of the membrane confirming the lung protection may be the cause of the restoration of the antioxidant enzymes' activity, thereby indicating its antioxidant efficacy and validating the use of forskolin as an anti-asthmatic agent¹⁴.

3. *Piper betle* (*Milagu-Tamil Name*)

Betelvine the Piperaceae family includes the plant species known as Piper betle (*P. betle*), which is widely used as a medicine in South East Asia. In Siddha system the leaf is both externally applied and also used internally for expulsion of phlegm and chest

congestion¹⁰. Experimental evidence suggests that *P. betle* leaves have antibacterial properties, The volatile oil that makes up the majority of the leaves is composed primarily of phenols, including betel phenol, chavibetol and chavicol, cadinene, and hydroxychavicol, which have been linked to anti-oxidant and anti-carcinogenic properties^{15,16}. Piper betle leaf methanolic extract proved to be safe up to a dose of 1000 mg/kg (p.o.) body weight. The anti-inflammatory effect of MPBL was dose-dependent and statistically significant (p 0.05). At a dose of 200 mg/kg, MPBL demonstrated excellent anti-inflammatory effects (66.66% inhibition)¹⁷. Additionally, it was demonstrated by Rahul Hajare et al. that an ethanolic extract and an essential oil extract from the leaves of *P. betle* Linn. have anti-histamine effects on guinea pigs. Additionally, *P. betle* disrupted histamine aerosol extracts cause bronchoconstriction in the entire guinea pig, with essential oil being more potent than ethanolic extract in this regard¹⁸. The immunomodulatory activity of Piper betel L.'s methanolic extract, which contains a blend of phenols, flavonoids, tannins, and polysaccharides, resulted in a decrease in antibody titre and an increase in the suppression of inflammation, indicating that the extract may have an immunosuppressive effect on mice's cellular and humoral responses^{19,20}.

4. *Tachyspermum ammi* (Omam-Tamil Name)

Trachyspermum ammi L., a member of the Apiaceae family, is a highly prized seed spice with significant therapeutic significance. In Siddha system the seeds are used as carminative and for diarrhoeal diseases¹⁰. Both the seeds and the roots have strong diuretic and aphrodisiac qualities. The seeds contain 2-4.4% of ajwain oil, a brownish oil. Thymol, the major ingredient in this oil, is used to treat bronchial issues, appetite loss, and gastrointestinal conditions. On people, the oil has fungicidal, antibacterial, and anti-aggregatory properties. It is a crucial remedy for diarrhoea, atonic dyspepsia, and flatulence^{21,22}.

In a research, rats given 100 mg/kg of the total alcoholic extract (TAE) and total aqueous extract (TAQ) of seeds showed a significant, dose-dependent suppression of castor oil-induced diarrhoea. When compared to the castor oil group, the diarrhoeal droppings were dramatically reduced by the TAE and TAQ extracts. The outcomes for TAE and TAQ extracts were comparable to those of the usual medication, loperamide (3 mg/kg), in both the small and large intestine intestinal fluids²³. The presence of tannins, flavonoids, saponins, alkaloids, sterols, reducing sugars, and triterpenes in medicinal plants was shown to be responsible for their antidiarrheal and anti-dysenteric effects^{24,25}.

When compared to the control group of rats, the extract at doses of 100 mg/kg and 200 mg/kg demonstrated considerable protection (P 0.001) by reducing ulcerative lesions. The results showed that the fruit extract from *T. ammi* has strong antiulcer action²⁶. For colic, the decoction of 3 g of powdered mixture of ajwain seeds, dried ginger, and black salt is given with warm water was proved to be effective²⁷.

5. *Azadirachta indica* (Vembu -Tamil Name)

Neem tree belongs to the family Meliaceae which is found in tropical and semitropical regions like India, Bangladesh, Pakistan, and Nepal. It is a fast-growing, which grows upto 20–23 m tall and trunk is straight and has a diameter around 4-5 ft.

Azadirachta indica L. (neem) has various chemically active constituent such as azadirachtin, nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinat, gedunin, salannin, and quercetin²⁸. It is noted that it is highly potent in dose-dependently blocking gastric ulcer induced by restraint-cold stress and indomethacin with ED₅₀ value of 1.5 and 1.25 mg Kg⁻¹ b.w. Thus the Neem bark extract has therapeutic potential for the control of gastric hyperacidity and ulcer²⁹.

6. In traditional medicine it helps in balancing the vitiated conditions of pitta (body heat) and kapha (cough formation). Mohammad A. Alzohairy et al study on rats model showed that azadirachtin did not show toxicity even at 5 g/kg bw²⁸. In the acute toxicity test, the LD₅₀ values of neem oil were found to be 31.95 g/kg, test for acute oral toxicity in mice revealed that LD₅₀ value of approximately 13 g/kg body weight²⁸. The phytochemical azadirachtin has been demonstrated to have antimicrobial and antifungal properties³⁰. Therefore it can be externally applied for various bacterial and fungal infections of skin and also for worm infestations in children. Also, after 1 year of external exposure to 1% neem oil 110 children did not experience any major adverse effects³¹.

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8. *Glycyrrhiza glabra* (Athimathuram-Tamil Name):

Glycyrrhiza glabra (Athimathuram) has been indicated for various respiratory and gastrointestinal disorders of Children¹⁰. Glycyrrhizin is the major ingredient present in Licorice, the root of *Glycyrrhiza glabra*. This compound has been used as traditional plant-based medicine as well as a sweetener, drinks, and foods in Asian, the US, and European countries. Because of its sweet taste, a Greek physicist, Pedanius Dioscorides, named licorice “sweet root”³². The roots of *Glycyrrhiza glabra* Linn. chiefly contain an active principle glycyrrhizin (3.6%) which is a combination of glycyrrhetic acid and glucuronic acid³³. Glycyrrhizin, glycyrrhizinic acid, isoliquiritin, and glycyrrhizic acid are chemicals found in this plant shows anti-asthmatic properties. Flavonoids present in *Glycyrrhiza* supports a normal and healthy gastrointestinal tract. Dried root powder of 1 g is recommended for asthma. The active constituents of *Glycyrrhiza glabra* such as glycyrrhizic acid helps to treat COPD³⁴. Both 18 β -glycyrrhetic acid and glycyrrhizic acid is important biological inhibitors for remedying lung inflammation. It also showed that Glycyrrhizic acid of *Glycyrrhiza glabra* used in a mice model helps treating irradiation-induced pneumonitis/fibrosis, inhibiting airway constriction, hyperreactivity, eosinophils, remodeling, infiltration and inflammation in the airway³⁵. Blumenthal et al explained the dosage of deglycyrrhizinated licorice extract to be given for children, the minimum dosage to be given for children in the age 2-4 years is 33mg and the maximum is 190 mg, min dosage for 5-9 years is 50mg and the max is 285 mg, min dosage for 10-11 years is 100 mg and the max is 570 mg³⁶.

3. CONCLUSION

Through this review the common herbs indicated for pediatric ailments have been scientifically validated. This preliminary work demands evaluation of more such herbs for common pediatric issues and for further preclinical and clinical studies.

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