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EXPLORING THE POTENTIAL OF ACORUS CALAMUS: A REVIEW OF ITS PROMISING ROLE IN PEDIATRIC PHARMACOTHERAPY

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ABSTRACT

Acorus calamus, known as Vacha in Ayurveda, has a rich history of traditional medicinal uses including the treatment of various ailments in both adults and children. The plant's rhizomes and leaves have been utilised for various therapeutic purposes such as treating speech problems, fever, asthma, bronchitis, cough, digestive issues, convulsions and as a sedative, nootropic, and antimicrobial agent. Various researches have confirmed the Neuroprotective properties, Nootropic effects, Anticonvulsant and Antiepileptic activities, Antioxidant and Anti-inflammatory effect, Antimicrobial and anthelmintic Activity, Airway relaxant properties, Antidiarrheal and Antispasmodic properties of the herb. In Ayurvedic medicine Acorus calamus is said to be effective in various health conditions of children specially memory and cognition related problems. Traditionally also it is used in various pediatric problems in various cultures including India, China and Africa. Its traditional uses align with modern research findings, highlighting its promising therapeutic potential for various conditions affecting children.

KEYWORDS: In Ayurvedic medicine Acorus calamus is said to be effective in various health conditions of children specially memory and cognition related problems.

INTRODUCTION

In India, Children are considered as the country's bright future, but they also face big health problems. Even though India is full of rich traditions and growing wealth, many kids are still sick. Whether they live in busy cities or quiet villages, children all over India have to deal with lots of health issues that need quick help. Amongst the common health ailments of

children, Respiratory diseases including infectious and allergic causes,[1] digestive problems,[2] neurodevelopmental issues[3] including speech problems loom large. Ayurveda being our own traditional health care science have addressed above issues in preventive as well as curative aspects.

Acorus calamus, commonly known as Vacha, is one of the drugs which is described by Ayurveda in many pediatric conditions. It has a history of traditional medicinal uses, including the treatment of various ailments in both adults and children. The rhizomes of Acorus calamus have been used in various forms, such as powder, paste, decoction and medicated Ghee, to address issues like diarrhea, epilepsy, skin diseases, headache, and indigestion.[4] The plant has been utilised in traditional medicine for conditions such as phlegm syncope, stroke, epilepsy, palpitation, amnesia, tinnitus, deafness, and pediatric febrile convulsions[5,6] and is used as sedative, anti-diarrheic, carminative, tonic, stimulant.[7] In Ayurveda, Acorus calamus is considered a vital herb, known for its role as a 'rejuvenator' for the brain and nervous system, and as a remedy for digestive disorders.[8]

Acorus Calamus is advised in infants for regular use to improve cognition, memory and to learn speech. It is also used in various formulations described for pediatric use by ancient texts.[9] Research also backs the benefits mentioned in Ayurveda texts and traditional use. Hence the review of the drug was done considering its utility in the pediatric population.

1. Neuroprotective Effect: Research has highlighted the neuroprotective potential of Acorus calamus, showcasing its ability to mitigate neuropathic pain and protect against neurotoxicity. Studies have also explored the plant's impact on oxidative stress, inflammation, and calcium inhibition, indicating its multifaceted pharmacological properties.[10,11] In Animal trials it reversed the neurotoxicity induced cognitive impairment associated with phenytoin and phenobarbital.[12]

2. Effect on Memory and cognition: Acorus calamus has been investigated for its effects on memory loss and cognitive disorders, aligning with its traditional use in addressing memory-related symptoms.[13] It has shown Significant change in the mental balance score, holding of like and different pairs, late-immediate memory in adults[14] it has also shown Significant improvement in terms of recall memory, cognitive impairment, amnesia, concentration ability, depression, and stress when studied in combination formulation.[15]

3. Antiinflammatory and Antioxidant activity: The herb's anti-inflammatory activity has been demonstrated, suggesting its potential in alleviating inflammatory conditions.[16] Acorus calamus has shown inhibitory effects on processes like lipid peroxidation and albumin denaturation, indicating its potential in combating oxidative damage.[17,18]

4. Anticonvulsant and Antiepileptic Effect: The drug shows anticonvulsant effect probably through potentiating the action of gamma-aminobutyric acid (GABA) pathways.[19] The raw rhizome has shown significant anticonvulsant activity by minimizing the span of the tonic extensor period in rats, while Cow urine purified rhizome has shown better anticonvulsant activity.[20] It has also demonstrated the potential as the effective antiepileptic drug.[18]

5. Antimicrobial activity: The drug has shown antimicrobial activity against various bacterial infections including nosocomial infections.[21]

6. Effect on Respiratory system: Presence of various airways relaxant contents in extract of *Acorus calamus*, provide a pharmacological basis for traditional use of *Acorus calamus* in disorders of airways. It contains a papaverine-like dual inhibitor of calcium channels, phosphodiesterase in n-hexane fraction along with anticholinergic, rolipram-like phosphodiesterase 4 inhibitor in ethyl acetate fraction. It has also shown associated cardiac depressant effect.[22] Mucirin, a bioactive fraction of A. calamus rhizome, is found effective to treat disease related to mucus hypersecretion, including cough, bronchitis and COPD.[23]

7. Effect on Digestive system

a. Antispasmodic[24]: Acorus Calamus extract shows spasmolytic activity, mediated through calcium channel blockade (CCB). Which can be considered as a base for its traditional use in colic pain.

b. Antidiarrheal activity[25]: Acorus calamus leaf extracts produce significant decrease in the severity of diarrhoea by reducing the rate of defecation in Wistar albino rats. It also decrease intestinal Transit by reducing motility.

c. Anthelmintic Properties[26]: *A. calamus* has shown significant effect against intestinal helminths in animal studies.

DISCUSSION

Acorus calamus is one of the popular herbs used for health ailments of children in india since vedic period. Its Sanskrit name Vacha means related to Speech, may be due to its traditional use in speech disorders. It is also part of a popular drug Sarasvat Churna, which is specially used in speech disorders in children.[27] It is also popular drug for its nootropic effect in children as well as adults.[28] Its rhizome powder is used with honey or processed in ghee for its nootropic effect. Research studies have also shown its effect on memory and cognition.

It is also traditionally used in convulsions and epilepsy. It is one of the drugs used in febrile convulsion in children. Studies have proved its anticonvulsant and antiepileptic activity.

Respiratory diseases pose a significant health burden on children worldwide, and India is no exception. Several factors contribute to the high prevalence and burden of respiratory diseases among children in India, including air pollution, indoor smoke exposure from biomass fuels, overcrowding, poor sanitation, and limited access to healthcare services. Acorus calamus is used in disorders caused by phlegm that is disorders related to the respiratory system like asthma, upper and lower respiratory infections. It is used internally and also as an external application for the above conditions. Research also supports its use in respiratory disorders due to its anti-inflammatory activity, airway relaxant activity and antimicrobial activity.

Soil-transmitted helminth (STH) infections are among the most common infections worldwide with an estimated 1.5 billion infected people or 24% of the world's population. Over 260 million preschool-age children, 654 million school-age children, 108 million adolescent girls and 138.8 million pregnant and lactating women live in areas where these parasites are intensively transmitted, and are in need of treatment and preventive interventions.[29] Traditionally used drugs can be effective here due to their easy availability, anthelmintic properties and recurrent requirements. Acorus calamus is one such drug which can be used in children for a variety of purposes and can give an additional anthelmintic effect.

Acorus calamus is also effective in diarrhea and a variety of digestive problems like colic pain. Diarrheal diseases continue to be a significant health challenge for children in India, contributing to morbidity and mortality, especially in the under-five age group. Acorus calamus due to its antidiarrheal properties and antispasmodic effect along with antimicrobial and anthelmintic properties can be considered important in diarrhea in children.

CONCLUSION

In conclusion, Acorus calamus is a versatile plant with a wide range of potential pediatric uses, from anticonvulsant and neuroprotective effects to anti-inflammatory, antimicrobial, and airway relaxant properties. Its traditional uses align with modern research findings, highlighting its promising therapeutic potential for various conditions affecting children. Further studies and clinical trials are needed to fully understand the pediatric applications of Acorus calamus and ensure its safe and effective use in pediatric populations.

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