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REVIEW ARTICLE

Traditional Herbal Approaches to the Management of Autism Spectrum Disorder (ASD): A Review

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ABSTRACT

Autism Spectrum Disorder (ASD) presents significant challenges for affected individuals and their families. While conventional treatments are prevalent, there is growing interest in complementary and alternative therapies, including plant-based remedies from traditional medicine systems. This review explores the use of plant-based treatments for ASD from Chinese Traditional Medicine, Ayurveda, Unani, Siddha, and other holistic systems. The article synthesizes research findings on the efficacy, safety, and potential therapeutic benefits of these treatments for managing autism symptoms, particularly in areas related to cognition, behavior, and emotional regulation. Furthermore, it presents an overview of various plant-based substances, including herbs, oils, and dietary modifications, and critically discusses their integration into ASD treatment.

Keywords: Autism Spectrum Disorder (ASD), Plant-Based Remedies, Traditional Medicine, Chinese Medicine, Ayurveda, Unani, Siddha, Herbal Therapy, Autism Treatment.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a multifaceted neurodevelopmental disorder that affects social interactions, communication skills, and behavior. Autism also has a serious impact on education and employment opportunities. As per reports published on Autism Research by Zeidan J *et al*. (2022), it is estimated that worldwide about 1 in 100 children has autism. Whereas, 01 in 36 children aged 8 years (approximately 4% of boys and 1% of girls) was estimated to have ASD in America (Maenner, *et al*, 2023). These estimates are higher than previous ADDM Network estimates during 2000–2018. Conventional therapies such as applied behavioral analysis (ABA) and pharmacological interventions are commonly used to manage symptoms of ASD. However, interest in alternative approaches, especially those that involve plant-based remedies, has been growing. This review focuses on the use of plant-based therapies from several traditional systems of medicine, such as Chinese Traditional Medicine (TCM), Ayurveda, Unani, and Siddha.

These traditional systems have an age-old history of using plant-based remedies to treat a wide range of disorders, including neurological and developmental conditions. This article aims to highlight the historical use of plants in treating autism, evaluate current research, and identify potential areas of synergy between traditional remedies and modern clinical practices for ASD.

METHODOLOGY

This review involved a comprehensive search of secondary data sources such as scientific books, research papers, repositories and archives such as PubMed, Scopus, Google Scholar, and JSTOR to gather relevant studies, clinical trials, and articles for studies and clinical trials on plant-based remedies for autism. Relevant studies from traditional medicine texts and ethnobotanical resources were also consulted. The review includes articles published from 2005 to 2025. To search the literature published and available on internet used the relevant Keywords such as Autism, Plant-based therapies, Indian traditional medicine, Chinese Medicine, Ayurveda, Unani, and Siddha with various keyword combinations viz. Autism Spectrum Disorder treatment plant-based remedies, Chinese Traditional Medicine Autism, Ayurveda ASD, Unani Medicine Autism treatment, Siddha Autism remedies, etc. also focused on randomized controlled trials, observational studies and case studies as primary source of information, Secondary sources include systematic reviews, meta-analyses, expert reviews and also referred ancient texts, ethnobotanical studies, and qualitative research on plant-based remedies used historically.

REVIEW OF LITERATURE

Chinese Traditional Medicine

Chinese Traditional Medicine has a rich tradition of using herbal and holistic treatments to address various neurological disorders. Chinese herbal medicine begins to address ASD by engendering a healthy middle jiao, supporting proper circulation and clearing Shen disturbance. In the context of ASD, TCM focuses on balancing the Qi (vital energy), nourishing the Yin, and calming the Yang to improve social and cognitive abilities.

A simple combination of *Taraxicum sinicum* Kitag. extract powder or granules and bentonite clay may be encapsulated and administered during the initial stages of treatment. Herbs should also be added as needed to address slow transit time in the large intestine and thereby reduce chronic inflammation, such as *Cannabis indica* Lam. and *Sesamum indicum* L. Common culinary herbs such as *Cinnamomi cassia* (L.) J. Presl, *Syzygium aromaticum* (L.) Merr. & L. M. Perry, *Coriandrum sativum* L., *Artemesia vulagris* L., *Ocimum basilicum* L., *Menthe haplocalyx* Briq., *Cymbopogon nardus* (L.) Rendle, and *Thymus vulgaris* L. can be added in to the formula and/or included in the child's diet to help heal the gastrointestinal lining. Herbs such *as Juniperus communis* L., *Cymbopogon martini* (Roxb.) Wats., *Citrus limon* (L.) Osbeck, *Citrus maxima* (Burm.) Merr. and *Chrysanthemum morifolium* (Ramat.) Hemsl. may be added in as needed, and it should be recommended that the child take the formula with very pure fish or algae oils (Lola B. 2023)

Gingko biloba L., a well-known herb in Chinese Traditional Medicine, has been studied for its cognitive-enhancing properties. Several studies suggest its potential in improving social behaviors and reducing repetitive behaviors in children with ASD (Zhang *et al*., 2022). Ginseng (*Panax ginseng* C. A. Mey.) is often prescribed in Chinese Traditional Medicine for boosting cognitive function and energy levels. It has been shown to improve focus and reduce hyperactivity in children with autism (Li *et al*., 2020). *Schisandra chinensis* (Turcz.) Baill., another herb in Chinese traditional medicine, is used to calm the mind and improve cognitive performance. It has shown promise in reducing irritability and improving attention span (Song *et al*., 2019).

Ayurveda and Autism

Ayurveda, the traditional system of medicine from India, emphasizes the balance of the three doshas (Vata, Pitta, and Kapha) for mental and physical health. Ayurveda uses herbal treatments to restore this balance, and certain herbs are thought to help manage the symptoms of ASD. Ayurveda understand the nature of human brain in a completely different manner from modern psychiatric and physiological theories.

In ancient writings, the juice of *Bacopa monnieri* (L.) Pennell (Brahmi), *Acorus calamus* L. (Vacha), and *Saussurea lappa* (Decne.) Sch.Bip. (Kushtha), as well as the white-flowered variety of *Convolvulus. prostratus* Forssk. (Shankhpushpi), were also employed by Acharya Charaka, one of the renowned ancient Indian physicians, to treat epilepsy and insanity. Similar viewpoints were expressed in Chakradatta's Chikitsasangraha, Kaideva Nighantu's Ayurveda Saar Sangraha, and others (Khare, 2011)

Autism has close similarities to the features of that Unmada which is described in Ayurveda. The condition may be due to Khavaigunya (disrrangements) of Srotas (channels) which nurtures Manas (mind) as a consequence of many Agantuja (epigenetic and toxic insults and post-natal environmental factor) and Sahaja (genetic) factors. Among the various type of treatment modalities Yuktivyapashrya Chikitsa plays a vital role in managing the symptoms of autism in children (Patil *et al*, 2023)

Vacha (*Acorus calamus* L.) stimulates the power of self-expression and intelligence. A study of the *Acorus calamus* L. was done to induce neurotoxicity against acrylamide to increase the activity of the corpus striatum while dopamine receptors decreased. These neurobehavioral changes are occurring by ACR (acrylamide) for treating diseases with the *Acorus calamus* L. rhizome (Shukla *et al* 2002).

Brahmi (*Bacopa monnieri* (L.) Pennell) is a widely used herb in Ayurveda known for its cognitive-enhancing properties. Studies show that Brahmi supplementation improves memory, social behavior, and cognitive function in children with ASD (Singh *et al*., 2021).

Yastimadhu (*Glycyrrhiza glabra* L.) in Ayurvedic system classified as a medhya rasayana that can enhance brain function. Neurodegenerative diseases are characterized by gradual loss of neuronal structure and function (Karthikkeyan *et al* 2021).

Kushmanda (*Benincasa hispida* (Thunb.) Cogn.) fruits have volatile oils, flavonoids, glycosides, saccharides, carotenes, vitamins, minerals, ß-sitosterol and uronic acid. This drug has been proven for multiple pharmacological activities such as antioxidant, anxiolytic, anti-compulsive, anticonvulsant, antidepressant, significant action on Alzheimer's disease, etc. (Panchaware *et al* 2015).

Jyotishmati (*Celastrus paniculatus* Willd.) is neuroprotective and shows intellect-promoting activity implicated in free radical scavenging and antioxidant properties. The recommended therapeutic form is a fine paste of the whole plant (Bhatnagar *et al* 2005).

Ashwagandha (*Withania somnifera* (L.) Dunal) is often used as an adaptogen to reduce stress and improve mood. Clinical trials have demonstrated that Ashwagandha may reduce anxiety and aggression in children with autism (Chaudhary *et al*., 2022).

Turmeric (*Curcuma longa* L.), known for its anti-inflammatory and antioxidant properties, is used in Ayurveda for its potential to reduce inflammation and oxidative stress, both of which are implicated in ASD (Patel *et al*., 2020).

Shankhapushpi (*Convolvulus prostrates* Forssk.) traditionally used to enhance cognitive function and manage neuropsychiatric conditions, Shankhapushpi may contribute to improvements in learning and memory (Jigyasha *et al*, 2023). *Centella asiatica* (L.) Urban (Gotu Kola) employed for its potential in enhancing cognitive function and supporting mental clarity, Gotu Kola is considered beneficial in managing symptoms associated with cognitive impairments. While these herbs are integral to Ayurvedic practice, scientific research evaluating their efficacy specifically in ASD treatment is limited. (Gasparotto, *et al*. 2018)

Guduchi (*Tinospora cordifolia* (Thunb.) Miers) have been claims that it can improve memory and learning. In a behavioral test noted that improved cognition in healthy animals with cognition deficiencies, the passive avoidance task (Yalla, *et al* 2010).

Badam (*Prunus amygdalus* Batsch) & Soya (*Glysine max* (L.) Merr.) is rich source of vitamin B6 and B12, magnesium, and selenium is helpful for autistic patients. t is recommended that autistic people use magnesium rich sources such as soya bean. *Terminalia chebula* Retz. is a drug of choice for autism in adults and children with slowness. It should be processed with honey (Selvakumari *et al* 2019).

The commonly used herbal medicines included *Wolfiporia extensa* (Peck) Ginns, *Panax ginseng* C.A.Mey., *Acorus gramineus* Sol. Aiton, *Schisandra chinensis*

(Turcz.) Baill., and *Glycyrrhiza uralensis* Fisch. ex-DC. One study reported that *P. ginseng* C. A. Mey., improved abnormal behaviors in animal models of autism. (Gonzales *et al* 2016)

Unani Medicine and Autism

Unani medicine, a traditional system of healing with roots in Greco-Arabic practices, offers various herbal treatments that have been explored for managing ASD symptoms and to balance the humors in the body. The study emphasized herbs such as *Emblica officinalis* L. (Amla), *Delphinium denudatum* Wall. ex-Hook.f. & Thomson (Jadwar), *Bacopa monnieri* (L.) Pennell (Brahmi), and *Prunus amygdalus* Batsch (Badam), noting their potential benefits (Shamsi *et al* 2019). Brahmi (*Centella asiatica* (L.) Urban) medication along with conservative treatment approached such as occupational therapy, play therapy and early intervention may enhance the rate of progress in quality of life (QOL) of autistic kids (Mukherji *et al*, 2017).

Saffron (*Crocus sativus* L.), an herb used in Unani medicine, is recognized for its calming effects and potential to improve mood. Research suggests saffron may help in alleviating symptoms of ASD, such as irritability and sleep disturbances (Amin *et al*., 2018).

Ajwain (*Carum copticum* (L.) Link) has shown potential in reducing digestive issues and improving mental clarity. Since gastrointestinal problems are common in children with autism, this herb may provide beneficial effects in managing both digestive and neurological symptoms (Ali *et al*., 2017).

Siddha Medicine and Autism

The Siddha system of medicine, one of India's traditional healing practices in South India that emphasizes the use of herbs and minerals to treat various disorders. It has been explored for its potential in managing ASD symptoms through various herbal formulations and therapeutic interventions.

A clinical trial investigated the effects of *Amukkara Chooranam* (an herbal powder) and *Yegamooli Thylam* (an herbal oil) in pediatric patients diagnosed with ASD. The study involved 30 participants who received these Siddha formulations over 90 days. Significant improvements were observed in clinical assessment parameters, suggesting the potential efficacy of these treatments in managing ASD symptoms (Elangovan *et al* 2023).

Another study presented case reports of children with ASD treated with *Brahmi Nei* (a ghee-based herbal preparation) and *Varma* therapy (a traditional manipulative technique). Over a three-month period, improvements were noted in cognitive skills, eye contact, and reduced hyperactivity. The ghee-based formulation is believed to facilitate the delivery of herbal compounds across the blood-brain barrier, enhancing therapeutic effects (Darshani *et al*, 2018).

A study documented two case reports of children with ASD undergoing a Siddha treatment regimen, including herbal medications and external therapies. The treatment aimed to improve quality of life by addressing core symptoms of ASD. Positive outcomes were reported, indicating the potential role of Siddha medicine in ASD management (Dharshani & Gayathri, 2022).

Research has explored the role of plant-food-derived bioactives as therapeutic agents in ASD. While not specific to Siddha medicine, the study highlights the potential of herbal compounds in modulating neurological pathways associated with autism, supporting the traditional use of herbs in managing ASD symptoms (Cruz-Martins *et al* 2021).

Shankhpushpi (*Convolvulus prostrates* Forssk.) is an herb traditionally used in Siddha medicine to improve cognitive function and treat mental disorders. Studies have shown it can enhance memory and cognitive behavior, making it a promising remedy for managing ASD symptoms (Raghavendra *et al*., 2021).

Kachnar (*Bauhinia variegata* (L.) Benth.) has anti-inflammatory and neuroprotective properties that may be beneficial in managing autism-related symptoms (Subramanian *et al*., 2020).

Plant-based Diet

In addition to herbal remedies, traditional medicine systems also emphasize the importance of diet in maintaining health. Many ASD children benefit from dietary changes, such as gluten-free or casein-free diets, which are rooted in both traditional and modern practices.

In Ayurveda, foods that balance the doshas and promote gut health are often recommended, as the gut-brain connection is seen as pivotal in managing developmental disorders.

In traditional Chinese medicine, foods that promote Qi and blood circulation are considered essential in maintaining brain health. Ingredients like goji berries, ginger, and Chinese yam are commonly prescribed for their neurological benefits.

In Siddha, the emphasis is on detoxification and rejuvenation of the body, with specific diets that include anti-inflammatory herbs and vegetables that promote brain health.

DISCUSSION

The integration of plant-based remedies from traditional systems such as Traditional Chinese Medicine, Ayurveda, Unani, and Siddha represent an exciting frontier in complementary treatments for autism. These systems offer a rich repository of therapeutic options, many of which have been validated by modern clinical research. However, several challenges remain-

Quality Control: The potency and consistency of herbal treatments can vary greatly depending on the source and preparation methods.

Standardization: There is a need for standardized protocols to ensure effective dosing and proper formulation.

Clinical Evidence: While there is significant anecdotal evidence and historical use, many traditional remedies have yet to undergo large-scale clinical trials.

The combination of traditional plant-based therapies with modern biomedical approaches could offer a holistic solution for managing ASD symptoms. However, it is crucial to conduct more rigorous research to assess the safety and efficacy of these therapies.

CONCLUSION

Herbal-based treatments for Autism Spectrum Disorder (ASD) are an integral part of various traditional medicine systems, including Traditional Chinese Medicine, Ayurveda, Unani, and Siddha medicine. These systems employ unique approaches, focusing on holistic healing, balancing bodily systems, and addressing underlying causes such as inflammation, oxidative stress, and neurotransmitter imbalances. While each system employs distinctive methods and formulations, they share common goals of improving cognitive function, reducing irritability, enhancing social behaviors, and supporting overall neurological health.

Traditional Chinese Medicine (TCM) employs herbs like *Gingko biloba* L., *Panax ginseng* C.A.Mey., and *Schisandra chinensis* (Turcz.) Baill., to enhance cognitive function, calm the mind, and improve attention. Culinary herbs and dietary recommendations also support gut health and brain function, which align with the TCM principles of Qi balance and Shen harmony. Specific formulations incorporating herbs like *Taraxicum sinicum* Kitag. and *Cannabis indica* L. aim to reduce inflammation and enhance gut-brain axis function.

In Ayurveda, herbs such as *Bacopa monnieri* (L.) Pennell (Brahmi), *Acorus calamus* L. (Vacha), and *Convolvulus prostratus* Forssk. (Shankhapushpi) are central in managing autism. These herbs enhance memory, reduce hyperactivity, and support neurotransmitter function. Ayurvedic treatments focus on balancing the doshas (Vata, Pitta, Kapha) and addressing Khavaigunya (channel disorders) to restore mental and physical harmony.

Unani practitioners use neuroprotective herbs like *Emblica officinalis* L. (Amla), *Delphinium denudatum* Wall. ex Hook.f. (Jadwar), and *Prunus amygdalus* (Badam) to manage ASD symptoms. The system emphasizes a combination of herbal formulations and therapies to balance the body's humors and improve quality of life.

Siddha treatments for autism include formulations like Amukkara Chooranam and Brahmi Nei, which demonstrate potential in improving cognitive skills, reducing hyperactivity, and enhancing social behaviors. External therapies such as Varma techniques are used alongside herbal medicines for a holistic approach.

Across all systems, dietary interventions play a significant role. Gluten-free, casein-free diets, and the inclusion of specific brain-supporting herbs and foods are recommended to strengthen the gut-brain axis.

Although traditional medicine systems offer promising herbal treatments for autism, the efficacy and safety of these remedies require rigorous clinical trials. Modern pharmacological studies should investigate these herbs' bioactive compounds and their effects on neurological pathways. A collaborative approach integrating traditional wisdom with contemporary research can lead to innovative, effective interventions for managing ASD. Further research is essential to confirm the therapeutic potential of these remedies, establish their safety profiles, and identify optimal treatment protocols. Collaboration between traditional medicine practitioners and modern researchers is essential for advancing this field.

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