



A CRITICAL REVIEW OF SPEECH AND LANGUAGE DELAY IN CHILDREN AND ITS MANAGEMENT

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ABSTRACT Speech and language delay in children is a common neurodevelopmental condition characterized by delayed acquisition of age-appropriate communication skills, affecting expressive and/or receptive language abilities. It is estimated to affect approximately 5–12% of children, with a higher prevalence in males. Speech delay is frequently associated with neurodevelopmental disorders, particularly autism spectrum disorder, where it often represents one of the earliest clinical manifestations. Current management strategies in modern medicine primarily include speech therapy, occupational therapy, behavioral interventions, etc. Despite these approaches, variability in treatment outcomes and delayed intervention remain significant challenges. Integrative management approaches that combine conventional therapies with traditional systems such as Ayurveda are gaining attention for their potential to enhance neurocognitive development and provide holistic care.

KEYWORDS : Speech delay, Language delay, Ayurveda, *Medhya Rasayana*, Neurodevelopmental disorders, Pediatric therapy, *Vak vikar*

1. INTRODUCTION

Speech and language development is a crucial indicator of neurodevelopmental integrity in early childhood. Speech delay affects approximately 5–12% of children worldwide, with increasing prevalence linked to environmental and neurobiological factors (1). Delayed speech not only impacts communication but also influences emotional regulation, learning ability, and social integration. In Ayurvedic literature, abnormalities in speech are described under conditions such as *Minmin* (indistinct or unclear speech) and *Gadgad* (stammering or hesitant speech), which are primarily attributed to vitiation of *Vata dosha* affecting *Vak indriya* (organ of speech) and higher cognitive functions.

Epidemiological evidence suggests that speech and language delay is more common in male children than females, with a reported male-to-female ratio ranging from 2:1 to 3:1. This gender disparity has been attributed to differences in neurodevelopmental maturation, genetic susceptibility, and environmental responsiveness. The prevalence of isolated speech and language delay has been estimated to range between 5% and 12% among children aged 2–5 years, with a median prevalence of approximately 6% (2). Such delays, if unaddressed, may predispose children to long-term academic difficulties, behavioral problems, and impaired psychosocial functioning.

Speech and language, although often used interchangeably, represent distinct yet interrelated domains of communication. Speech refers to the motor act of producing sounds and articulation, whereas language encompasses comprehension, processing, and expression of meaningful communication. Speech delay involves difficulty in sound production and articulation, while language delay reflects impairment in understanding or using words, gestures, or symbols for communication.

Table 1: Age-wise developmental milestones of speech and language in children

Age Range	Receptive Language (Understanding)	Expressive Language (Speech/Production)
Birth to 3 months	Alerts to sound; startles to loud noise	Cooing (vowel sounds), crying as communication
4 – 6 months	Turns toward voice; recognizes caregiver voice	Laughing, early vocal play, babbling begins
6 – 9 months	Responds to name; understands tone of voice	Babbling with consonant sounds (e.g., “ba”, “da”)
9 – 12 months	Understands simple words like “no”; follows simple gestures	Uses “mama/dada” non-specifically; uses gestures (pointing, waving)
12 – 18 months	Follows one-step commands with gestures; identifies body parts	Speaks 3–10 words; uses jargon-like speech

18 – 24 months	Follows simple commands without gestures; understands basic instructions	Vocabulary expands to 10–50+ words; begins two-word combinations
2 – 3 years	Understands two-step commands; basic spatial concepts (in, on, under)	Uses ≥50–200 words; forms two- to three-word sentences; speech partly intelligible
3 – 4 years	Understands complex instructions; follows multi-step commands	Uses >200 words; forms complete sentences; 75% speech intelligible
4 – 5 years	Understands abstract concepts and detailed instructions	Fluent speech with clear articulation; uses grammar appropriately

The developmental pathway of speech and language arises from a complex interplay of genetic, neurological, and environmental factors. Early childhood represents a critical period during which neural plasticity facilitates acquisition of communication skills through interaction, imitation, and cognitive processing. Disruption at any level—whether sensory (e.g., hearing impairment), neurological, or environmental—can significantly alter developmental outcomes.

Despite advances in pediatric neurology and speech therapy, variability in treatment outcomes persists. Current review largely focuses on symptom-based management, often overlooking holistic and preventive approaches. Conventional interventions such as speech therapy and behavioral training, although effective, may not fully address underlying neurocognitive and systemic factors influencing development. Modern evidence indicates that speech delay involves delayed cortical maturation, impaired neural connectivity, dysfunction in Broca's and Wernicke's areas.

Ayurveda provides a conceptual framework linking speech development to *Vata dosha*, *Buddhi* (intellect), *Smriti* (memory), and *Manas* (mind), emphasizing a holistic understanding of neurodevelopment. However, integration of these traditional concepts with modern clinical practice remains limited and insufficiently explored in contemporary research (4). Ayurveda correlates this with *Vata dushti* affecting neural transmission, impairment of *Majja dhatu*, dysfunction of *Manovaha srotas*.

2. MATERIAL AND METHODS

A systematic search was conducted across major databases including PubMed, Scopus, Web of Science, and Google Scholar.

3. MANAGEMENT STRATEGIES

Diagnostic evaluation & Modern Management

Effective management of speech and language delay requires a comprehensive, multidisciplinary approach, beginning with accurate

diagnosis and targeted intervention based on the underlying etiology.

Diagnostic Evaluation and Targeted Management

Early identification is achieved through standardized developmental screening tools such as the Denver Developmental Screening Test (DDST) and Ages and Stages Questionnaire (ASQ) (12,14). Audiological evaluation is essential to rule out hearing impairment, while neurodevelopmental assessment helps identify associated conditions such as autism spectrum disorder, intellectual disability, or global developmental delay (14,15). In selected cases, neuroimaging and genetic testing may be indicated (16).

Management strategies are tailored according to whether the delay is primarily speech-related or language-related:

Speech Delay (Articulation Disorders):

Managed through structured speech therapy, focusing on articulation training and phonological correction (17).

Language Delay (Receptive/Expressive):

Requires language stimulation therapy, including vocabulary building and comprehension training, often involving caregivers (18).

Supportive management

- Occupational Therapy if needed
- Supplements like Omega 3, Vitamin B12

Ayurvedic Management

Speech delay is understood in Ayurveda as a disorder of *Vak*, primarily involving *Vata dosha* and impairment of *Medha* and *Manas* (21,22).

A. Shamana Chikitsa

Ekal Dravya (Single Drugs):

- *Brahmi* (*Bacopa monnieri*) (23)
- *Shankhapushpi* (*Convolvulus pluricaulis*) (24)
- *Mandukaparni* (*Centella asiatica*)
- *Yashtimadhu* (*Glycyrrhiza glabra*) (25)
- *Vacha* (*Acorus calamus*) (26)

These drugs exhibit nootropic, neuroprotective, and cognitive-enhancing properties.

B. Shodhana Chikitsa (Panchakarma)

- *Nasya: Khseerbala Taila, Dhanvantar Taila* [Enhances higher mental functions and sensory pathways]
- *Shiropichu: Jatamansi Taila, Tila Taila* [Provides sustained nourishment to the brain and nervous system]
- *Shirodhara: Jatamansi Taila* [Improves cognitive function and mental stability]
- *Sarvanga Abhyanga with Bala-Ashwagandhadhi Taila, Jatamansi Taila, Ksheerbala Taila* [Reduces *Vata* and improves neuromuscular coordination]
- *Matrabasti: Tila Taila, Dashamool Tail and Jatamansi Taila* [Balances *Prana* and *Udana Vayu*]

C. Condition-Based Ayurvedic Management

- *Amajanya Samprapti: Rajanyadi Churna, Hinguvachadi Churna, Shunthi Churna Krimijanya Samprapti: Vidanga Churna, Krimikuthar Rasa*

4. DISCUSSION

Speech and language delay in children represents a heterogeneous developmental entity rather than a single diagnostic condition. In many cases it is associated with any neurodevelopmental disorders like cerebral palsy and Autism spectrum disorder. The present review indicates that delayed communication arises from a complex interaction of neurobiological maturation, sensory integrity, cognitive development, and environmental stimulation. An important conceptual distinction emerging from contemporary literature is that speech and language delay are not synonymous. Speech delay primarily involves deficits in articulation, phonological production, or motor execution of verbal sounds, whereas language delay reflects impairment in comprehension, symbolic representation, and expressive communication. This distinction is clinically important because diagnostic pathways and intervention strategies differ accordingly.

The present review underscores the importance of systematic diagnostic evaluation. Developmental screening tools such as the

Denver Developmental Screening Test and Ages and Stages Questionnaire remain useful for early identification, but their predictive value improves considerably when integrated with detailed clinical history, hearing assessment, and neurodevelopmental examination. The literature consistently shows that hearing impairment remains one of the most common and potentially reversible contributors to speech delay. Consequently, audiological evaluation should be considered mandatory in children presenting with persistent speech or language delay.

With respect to treatment, current biomedical literature strongly supports early intervention as the principal determinant of outcome. Speech therapy remains the cornerstone of management along with omega 3 and vitamin supplements, particularly for articulation and expressive speech disorders. Language delay, especially when involving receptive deficits, often requires broader intervention involving language stimulation, structured parent-mediated communication training, and occupational therapy. Children with associated neurodevelopmental disorders require individualized multidisciplinary management.

From the Ayurvedic perspective, delayed speech may be interpreted within the broader conceptual framework of *Vak vikara*, involving derangement of *Vata dosha*, particularly *Udana Vayu*, along with dysfunction of *Manovaha srotas*, *Buddhi*, and *Smriti*. Classical descriptions such as *Mook*, *Minmin* and *Gadgad* indicate that ancient Ayurvedic scholars recognized disorders of articulation and fluency.

The therapeutic rationale of Ayurvedic management in speech delay appears to center on neurocognitive modulation rather than isolated symptom suppression. *Medhya dravyas* such as *Brahmi*, *Shankhapushpi*, *Mandukaparni*, *Yashtimadhu*, and *Vacha* have demonstrated neuroprotective, antioxidant, and cognition-enhancing effects in experimental and clinical studies. These pharmacological properties may support synaptic plasticity, attentional regulation, and memory processing-domains highly relevant to speech and language acquisition.

Similarly, Panchakarma procedures as adjuvant treatment such as *Nasya*, *Shiropichu*, *Shirodhara*, and *Abhyanga* are traditionally indicated for disorders involving the higher nervous system and cognitive dysfunction. Their proposed mechanisms include autonomic modulation, reduction of psychophysiological stress, and improvement of sensory-motor integration. However, the current evidence base remains limited, as most available studies are small, observational, or methodologically heterogeneous.

An important contribution of the present review is the inclusion of *samprapti*-based individualized Ayurvedic management. The use of formulations such as *Rajanyadi Churna*, *Hinguvachadi Churna*, and *Shunthi Churna* in *Amajanya samprapti*, and *Vidanga Churna* and *Krimikuthar Rasa* in *Krimijanya samprapti*, reflects a distinctly etiological therapeutic logic. Along with Ayurvedic medication speech therapy a part of modern management also required in many cases. Long term Ayurvedic medication needed for atleast 6 months and encouraging improvement seen if treatment started in early childhood age (3-6 years).

5. CONCLUSION

It can be concluded that the integration of modern rehabilitative therapies with Ayurvedic interventions holds promise for a more holistic and individualized management strategy. Future research should focus on well-designed randomized controlled trials, standardization of treatment protocols, and development of evidence-based integrative models. Such efforts may improve functional communication outcomes and contribute to a more comprehensive understanding of pediatric speech and language disorders.

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