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Case Study

IMPROVING SCHOLASTIC SKILLS IN CHILDREN WITH SPECIFIC LEARNING DISABILITY- AN AYURVEDIC APPROACH

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ABSTRACT

Specific Learning Disability (SLD) is one of the major causes of scholastic backwardness in children. The characteristic features include persistent difficulties in reading, writing and mathematics despite adequate intelligence. The condition significantly affects cognitive, emotional and social functioning. In this article the effectiveness of selected Ayurvedic formulation is assessed in improving cognitive functions and scholastic skills in children diagnosed with SLD. **Methods:** Two children aged 11 years, diagnosed with SLD and having average intellectual functions were treated with Ayurvedic medicines for three months. Pre and post assessments were conducted using standardized neuropsychological tools, including Raven's coloured progressive matrices (CPM), NIMHANS Specific Learning Disability Battery, Number Cancellation Test, and N-Back Tests for working memory. **Results:** Both children demonstrated improvement in attention, working memory, and academic skills following treatment. A reduction in scholastic errors, decreased attention errors, improved task completion time, and enhanced working memory performance were observed. Mild improvement in overall cognitive efficiency was also noted. **Conclusion:** Ayurvedic intervention showed beneficial effects on cognitive domains such as attention, memory, and learning in children with SLD. The holistic approach of Ayurveda may serve as a supportive therapeutic option in the multidisciplinary management of SLD. Further large-scale controlled studies are recommended to validate these findings.

INTRODUCTION

Learning difficulties in children represent a major public health and educational concern, with long-term effects on social development, academic achievement, and psychological well-being. A neurodevelopmental disorder known as specific learning disorder is defined by ongoing challenges in learning and applying academic skills, even in the presence of sufficient intellectual capacity and access to suitable educational solutions. These difficulties reflect impairments in fundamental psychological processes involved in understanding and processing language, written symbols, and numerical information, and must persist for at least six months despite targeted support. [1]

Children with learning difficulties commonly exhibit inaccurate or slow and difficulty word reading, characterized by reluctance, repeated guessing, and trouble decoding words. Even when reading accuracy is preserved, many children struggle to fully comprehend written content, exhibiting deficiencies in understanding sequences, linkages, inferences, and deeper meanings of text. [2] The other major difficulty is seen in spelling, where letters are frequently omitted, added, or substituted, as well as in written expression, where written output may be marked by poor organization, grammar and punctuation problems, and unclear idea expression. Impaired number sense, a lack of comprehension of numerical scale and relationships, trouble remembering fundamental arithmetic principles, a dependence on finger counting, and

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confusion during multi-step calculations. These persistent academic impairments significantly interfere with scholastic performance and everyday functioning [1].

Children with learning disabilities are predisposed to a variety of related psychosocial issues, including low self-esteem, diminished motivation, academic underachievement, and issues with peer interactions [3]. From a neurocognitive perspective, learning problems are primarily characterized by deficiencies in executive functioning, working memory, and attention. Working memory is the temporary storage and manipulation of information required for learning, reasoning, and comprehension, whereas attention is the ability to concentrate and maintain focus on a task [4]. The integration of new material with prior knowledge is disrupted by impairments in various cognitive areas, which has a negative impact on the development of academic skills. [5]

Ayurveda emphasizes the coordinated functioning of *Manas* (mind), *Buddhi* (intellect), *Smriti* (memory), and *Medha* (cognitive capacity) to provide a comprehensive framework for comprehending cognitive development and learning processes. Disturbances in *Dhee* (intellectual discrimination), *Dhriti* (attention and mental stability), and *Smriti*, which are frequently linked to a functional imbalance of *Doshas*, especially *Vata*, which controls neurological and cognitive functions, can be regarded as learning challenges. Ayurvedic principles emphasize the significance of customized cognitive intervention techniques targeted at improving attention, memory, understanding, and adaptive learning abilities, while simultaneously promoting emotional balance and overall developmental harmony. Among the many clinical formulations for improving cognition *Kalyanaka Grita* and *Saraswatharishta* was chosen owing to its broad-spectrum clinical benefits in cognition, attention and memory. [6,7]

Case Report

In this case series, two children diagnosed with learning disability were treated at the District Ayurveda Hospital, Kannur. The presenting complaints included difficulty in reading and writing, poor attention span during studies, poor academic performance, impaired memory, restlessness, and easy distractibility. There were no psychological or developmental issues in either child. Both children undertook neuropsychological evaluation conducted by a qualified psychologist using selected attention paradigms. Social maturity was assessed using the Vineland Social Maturity Scale. Cognitive functioning and intellectual abilities were evaluated using Coloured Progressive Matrices and the Draw-A-Man Test, which indicated adequate intellectual functioning in both children. The assessment tools consisted of simple, age-appropriate tasks designed to assess attention, cognitive abilities, and social maturity across different developmental levels.

Case 1

The patient No.1 was a 11-year-old female was presenting with poor academic performance, low interest in studies, poor attention, and easily distractibility. She had reading and writing difficulties, frequent spelling errors, poor mathematical ability, and difficulty in learning and retaining lessons. She required repeated instructions and was slow in completing academic tasks. Otherwise, she was cooperative and didn't show any significant behavioural problems. 1Q level was found to be 92.

Case 2

The second patient was a 11-year-old male was presenting with poor academic skills, poor memory, poor attention, and easy distractibility. He had marked difficulty in reading and spelling, and showed poor performance in language-based subjects. However, he was found to be relatively good in Mathematics compared to other areas. There was no significant past history of medical or psychological illness. Otherwise, he was well adjusted with no major behavioural problems. On 1Q testing, intelligence level was found to be 95.

Table 1: Treatment given for both cases

S.No.	Medicine	Dose	Duration
1	*Kalyanaka ghrita*	10 grams twice daily before food	90 days
2	*Saraswatharista*	10 drops with 5ml milk once daily	90 days

Table 2: CPM (IQ) Scores Before and After Treatment

Patient	Pre-test IQ	Post test IQ
1	92	95
2	95	98

Table 3: NIMHANS SLD Battery Performance

Patient	Phase	Reading Errors	Writing Errors	Arithmetic Errors	Total Errors
Patient 1	Pre	16	18	12	46
	Post	10	11	7	28
Patient 2	Pre	14	17	11	42
	Post	11	12	7	30

Table 4: Attention Errors and Attention Time

Patient	Phase	Attention Errors	Attention time
Patient 1	Pre	82	6.3
	Post	58	5.5
Patient 2	Pre	76	6.1
	Post	61	5.4

Table 5: N Back 1 Test

Patient	Phase	Hits	Misses	Commissions	Total Errors
Patient 1	Pre	7	3	3	6
	Post	9	2	1	3
Patient 2	Pre	8	3	2	5
	Post	10	2	1	3

Table 6: N Back 2 Test

Patient	Phase	Hits	Misses	Commissions	Total Errors
Patient 1	Pre	6	9	3	12
	Post	8	7	2	9
Patient 2	Pre	7	8	2	10
	Post	9	6	2	8

Table 7: Total Working Memory

Patient	Phase	Attention Errors	Attention time
Patient 1	Pre	13	18
	Post	17	12
Patient 2	Pre	15	15
	Post	19	11

RESULTS AND DISCUSSION

Neuropsychological functions such as attention, working memory, intellectual functioning and academic skills were assessed before and after administration of Ayurvedic medicines for a period of 3 months.

Intellectual functioning was assessed using Raven's Colored Progressive Matrices (CPM). Academic skills were assessed using the NIMHANS Specific Learning (SLD) Battery. Attention was assessed using the Number Calculation Test. Working Memory was assessed using N Back Test I and N Back Test II

Intellectual Functioning: CPM was administered to rule out intellectual disability. Patient 1 obtained an IQ of 92 in pre-test and 95 in post-test. Patient 2 obtained an IQ of 95 in pre-test and 98 in post-test. This indicates that both children belong to this average intelligence range, and mild improvement in cognitive efficiency was observed in post-tests.

Academic Skills (NIMHANS SLD Battery): NIMHANS SLD Battery was used to assess reading, writing, spelling and arithmetic skills. In patient 1, total academic errors reduced from 46 to 28. In patient 2, total academic errors reduced from 42 to 30. Improvement was seen particularly in spelling accuracy, reading fluency and basic arithmetic.

Attention: Attention was assessed using the number cancellation test. In patient 1, attention errors reduced from 82 to 58, and attention time improved from 6.3 to

5.5 minutes. In patient 2, attention errors reduced from 76 to 61, and attention time improved from 6.1 to 5.4 minutes.

Working Memory: Working memory was assessed using N Back Test I and N Back Test II.

Patient 1 showed improvement with Hits increasing from 6 to 8 and total errors reducing from 12 to 9. Patient 2 showed improvement with Hits increasing from 7 to 9 and total errors reducing from 10 to 8.

Total Working Memory: Total working memory was calculated by combining N Back 1 and N Back II performance.

CONCLUSION

Both children showed improvement in attention by reduction in errors and task time. Working memory improved as indicated by increase in hits and reduced errors. Academic skills improved especially in reading, witting and arithmetic. Cognitive efficiency improved. This showed the efficacy of Ayurveda medicines in improving the cognitive domains of learning, attention and memory. The ability of the treatment in acting on the specified areas of brain and improve its overall cognitive function showed the holistic effect of Ayurvedic medicines in acting on the specified areas of brain.

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