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RESEARCH ARTICLE

Clinical Evaluation of *Brahmi Ghrita* and *Jyotishmati Taila* in the Management of Cognitive Deficit in Children

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ABSTRACT

Introduction: Cognition refers to the perceptual and intellectual aspects of mental functioning. A deficit in intellectual performances results in lack of cognition process to cognition deficit. The present study is carried out to evaluate the efficacy of *Brahmi gritha* and *Jyotishmathi taila* in cognitive deficit.

Materials and Methods: *Brahmi ghrita* has given orally in a dose of 10 gms twice daily with warm water/milk before food and *Jyotishmati taila* given as *Pratimarsha Nasya* (2-2 drops) in each nostril twice daily for a period of 12 weeks to evaluate the effect on clinical symptoms of Cognitive deficit and changes in mini-mental state examination (MMSE). Seventy-six cognitive deficit children were selected from outpatient department (OPD) of this Institute.

Observations and Results: Clinical symptoms revealed encouraging results such as lack of curiosity 100 to 11.9%, poor attention from 95.55 to 13.4%, moderate responses in decreased learning ability from 100 to 59.7%, mild response in the symptoms like language skill from 65.7 to 59.7%, asking same questions repeatedly from 20.9 to 17.9% and inability to understand and follow the directions from 89.6 to 86.6%. No response was observed in the symptoms like meeting educational demands in school and getting lost in the neighborhood and inability to get home. It provided significant effect on all symptoms of MMSE except registration and sensory perception at the end of the 84th day of the study. At the follow-up study (at the end of 14th week) it provided an insignificant effect on attention and concentration and registration and sensory perception. Lab reports show that no significant changes occur in almost all hematological parameters.

Conclusion: It may be interpreted that these medicines are safe for administration and also effective to improve the clinical symptoms of the cognitive deficit children.

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INTRODUCTION

Cognition denotes processing of specific information including thinking, memory, perception, motivation, skilled movements and language. It refers to the perceptual and intellectual aspects of mental functioning. A deficit in intellectual performances results in lack of cognition process to cognition deficit. Cognitive deficit or cognitive impairment is an inclusive term to describe any characteristic that acts as a barrier to the cognition process.[1] The term may describe deficits in global intellectual performance, such as mental retardation. It may describe specific deficits in cognitive abilities (learning disorders, dyslexia) or it may describe drug-induced cognitive/memory impairment, such as that seen with alcohol, glucocorticoids, and benzodiazepines.[2,3] Cognitive deficits may be congenital or caused by environmental factors such as brain injuries, neurological disorders or mental illness.[4,5] It may be part of a syndrome, and there may be a family history of similar difficulties. It is often associated with a history of delayed developmental milestones; the age at which it becomes manifest varies according to its severity. In some children, mild cognitive deficit becomes more obvious when the child starts attending school. Cognitive deficit causes a child to learn and develop more slowly than other children, may take longer to learn to speak, walk, and take care of personal needs such as dressing or eating and may face difficulty in learning at school. They will learn, but it will take them longer. There may be some things they cannot learn. Prevalence of cognitive deficit vary according to the causative factor involved like evidence of cognitive deficit was found among 47% of pediatric transverse myelitis patients.

In Ayurvedic classics, intellect is termed as *Buddhi* hence deficit in intellectual functioning, i.e., cognitive deficit can be termed as *Budhimandyata* by means of

Ayurveda. Numerous causative factors are mentioned in Ayurveda for this deficit intellectual functioning (cognitive deficit) including congenital factors (*Beejadosha*), non-fulfillment of desires of pregnant women (resulting into vitiation of *Vatadosha*), atheism of parents and their bad deeds in previous life, incompatible and improper diet, emotional and behavioral factors of the mother during pregnancy (*karma, asaya, kala, dosa, ahara, vihara*), suppression of natural urges (*Vegadharana*), and gynecological disorders (*Yonidosa*).[6-8]

Standardized tests of intelligence and adaptive behavior are used to diagnose cognitive deficit. A medical classification listed by the World Health Organization (WHO); 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD–10) chapter 'F' classifies Psychiatric disorders as mental and behavioral disorders and codes them on an alphanumeric system from F00 to F99. In that series F70–F79 classifies the mental retardation to the cognitive deficit in to the following degrees:

Average	90–109
Dull normal	80–90
Borderline	70–79
Mild MR	50–69
Moderate MR	35–49
Severe MR	21–34
Profound MR	< 20

Bacopa monnieri (L) Pennell and *Celastrus paniculatus willd*. have been used in the Ayurvedic system of medicine for centuries as a medhya dravya to enhance memory. Keeping in view this facts, the selection of the drugs were done.

Importance

The long term intervention of modern synthetic drugs have their adverse effects on the body and the potential toxicity of these drugs cannot be overlooked in designing the management strategies for the cases suffering from cognitive deficit/*Buddhimandyata*.[9,10]

Taking the above clinical significance with its prevalence there is a great need to find an effective remedy. Hence a sincere effort has been made to manage this disease with ayurvedic treatment for the betterment of the patients suffering from cognitive deficit.

In this study malin intelligence scale for indian children (MISIC) was used for calculation of IQ and the range of IQ was taken from 70–84 which falls between borderline to dull normal.[11]

MATERIALS AND METHODS

Materials

Here for the clinical study the *Brahmi ghrita* was prepared by Kottakkal Arya Vaidyashala, Kerala (Ref. API-Part-II, Vol-I, 63-64) and *Jyotishmati taila* was prepared by Dabur Research and Development Center, Ghaziabad, Uttar Pradesh as per classical reference API-Part-I, 2, 65-67

Methods

Before the commencement of the study, institutional ethical committee (IEC) clearance was obtained on 27/04/2011.

This study was registered under Clinical Trials Registry-India (CTRI). The registration number is CTRI/2012/03/002536.

Clinical Study: Patients attending the OPD during the year 2010-11 fulfilling the inclusion criteria were selected for the present study. Patients were selected and included irrespective of their caste and religion.

Study Design: Single blind, prospective interventional Study.

Inclusion Criteria

- Children of either sex aged between 8–13 years.
- Children of IQ 70–84 (as per MISIC).
- Willing and able to participate for 14 weeks.

Exclusion Criteria

- Children suffering from major systemic illness necessitating long-term drug treatment.
- Children with evidence of malignancy.
- Children with concurrent serious hepatic dysfunction (defined as AST and/or ALT >3 times of the upper normal limit) or renal dysfunction (defined as serum creatinine >1.2 mg/dL), uncontrolled pulmonary dysfunction (asthmatic and COPD patient).
- H/O hypersensitivity to any of the trial drug or their ingredients.
- Children who have completed participation in any other clinical trial during the past 6 months.
- Any other conditions which the investigator thinks may jeopardize the study.

Method of Study

This clinical study was accomplished in three phases:

- Diagnostic phase
- Interventional phase and
- Assessment phase

Diagnostic Phase

Total 67 patients were diagnosed based on signs and symptoms clinical presentation and MISIC and selected for the study after the following inclusion and exclusion

criteria. The nature of the study was explained to all the selected patients and their parents after that their consent (informed consent) was obtained. A special clinical proforma was prepared to incorporate both Ayurvedic (*Dashavidha Pareeksha*) and modern parameters. A detailed history was taken, and complete physical examination and laboratory investigations were also carried out. Relevant details of history and physical examination were done as per the 'protocol' for the study provided by CCRAS, New Delhi.

Interventional Phase: The study was intervened by the treatment with Brahmi ghrita internally in the dose of 10gms twice daily with warm water/milk before food and Nasya with Jyothishmathi Taila 2-2 drops twice daily in each nostril for 12 weeks.

Duration of Trial: The total duration of treatment for the subjects was three months.

Follow-up Study: Follow-up was conducted after one month during the trial and then after the completion of the trial.

Assessment Phase: The effect of treatment (results) was assessed regarding the clinical signs and symptoms and MISIC and the overall improvement was observed and recorded as before treatment (BT) and after treatment (AT).

Assessment Criteria

Criteria adopted for improvements were changes in modified child mini-mental scale examination (MMSE), Improvement in IQ in the form of Weschler's IQ Indian adaptation by Malin (MISIC). Laboratory investigations were done to assess the safety of the drug before and after the treatment.

MMSE was done at base line, 28th day, 56th day, 84th day and at the end of two weeks after completion of the treatment.

IQ (in the method of MISIC) was done at baseline and at the end of 84th day.

Lab Investigations were done at the baseline and at the end of 84th day.

Statistical Analysis

The obtained data were analyzed statistically. Primary outcome and secondary outcome measures were analyzed as the mean change in the response from baseline to 84th day by using a paired t-test. A p-value of <0.05 was considered significant. The analysis was carried out using the statistical package for the social sciences (SPSS) version 15.0.

Overall Assessment of Therapy: To assess the overall effect of therapy following criteria was laid down.

Completely Cured: More than 90% relief in symptoms and signs as well as changes of > 5 components of MMSE.

Markedly Improved: More than 75% and less than 90% relief in signs and symptoms as well as changes of >4 and < 5 components of MMSE.

Moderately Improved: More than 50% and less than 75% relief in signs and symptoms as well as changes of >2 and <4 components of MMSE.

No improvement/ Unchanged: Less than 25% relief in signs and symptoms as well as changes of <2 components of MMSE.

The total effect of therapy was assessed on the basis of the above first three criteria.

OBSERVATIONS AND RESULTS

Total 76 cases were included for the study out of which 67 completed the trial. All the subjects were able to read and write (100%), maximum were below poverty line (55.2%), Urban habitat (68.7%), maximum patients were Hindu (88.1%), *Prakriti* wise distribution shows that 44 subjects were of *Vata-Pittaja prakriti* (65.7%) and 23 were of *Vata-Kaphaja prakriti* (34.3%). According to birth history normal labor was perceived in 58 (86.6%) mothers and caesarian in nine mothers (13.4%). During child birth normal cry was present in 66 children(98.5%), jaundice was absent in 65 children (97%), cyanosis and congenital anomalies were not seen in any child. The normal milestone was observed in 55 children (82.1%) and delayed mile stone was detected in 12 children (17.9%) (Tables 1 to 9).

Therapeutic response of the treatment on chief complains showed that the symptom like asking the same question repeatedly was present in 14 children (20.9%)

Table 1: Educational status wise distribution of 67 patients

Educational status	*No. of patients*	*%*
Illiterate	0	0.0
Read and write	67	100.0
Total	67	100.0

Table 2: Socio-economic status wise distribution of 67 patients

Socio-economic status	*No. of patients*	*%*
Above poverty line	30	44.8
Below poverty line	37	55.2
Total	67	100.0

Table 3: Habitat wise distribution of 67 patients

Habitat	*No. of patients*	*%*
Urban	46	68.7
Semi-urban	4	6.0
Rural	17	25.4
Total	67	100.0

Table 4: Religion wise distribution of 67 patients

Religion	*No. of patients*	*%*
Hindu	59	88.1
Muslim	8	11.9
Sikh	0	0.0
Christian	0	0.0
Others	0	0.0
Total	67	100.0

Table 5: Prakriti wise distribution of 67 patients

Type of prakriti	*No. of patients*	*%*
Vata-Pittaja	44	65.7
Vata-Kaphaja	23	34.3
Total	67	100.0

Table 6: Birth history wise distribution of 67 patients

Labor	*No. of patients*	*%*
Normal	58	86.6
Abnormal	9	13.4
Total	67	100.0

Table 7: Cry at birth wise distribution of 67 patients

Cry	*No. of patients*	*%*
Normal	66	98.5
Delayed	1	1.5
No cry	0	0.0
Total	67	100.0

Table 8: Incidence of jaundice at birth wise distribution of 67 patients

Jaundice	*No. of patients*	*%*
No	65	97.0
Yes	2	3.0
Total	67	100.0

Table 9: Developmental milestones wise distribution of 67 patients

Milestones	*No. of patients*	*%*
Normal	55	82.1
Delayed	12	17.9
Total	67	100.0

at the baseline which was reduced to 13 children (19.4%) after completion of the treatment. Decreased learning activity was present in all 67 children (100%) at base line which was reduced to be present in 42 children (62.7%) at the end of the treatment. Inability to meet the educational demands at school was present in all 67 children (100%) at baseline which was not reduced after completion of treatment. Lack of curiosity was present in all 67 subjects (100%) which was reduced to be present in eight patients (11.9%) after treatment. Language skill (communication) retardation was present in 44 children (65.7%) which were reduced to 40 children (59.7%) at the completion of the treatment. Poor attention span was observed in 64 children (95.5%) which were reduced to be present in 9 children (13.4%) after completion of the treatment. Inability to understand and follow directions was present in 60 children (89.6%) which were reduced to be present in 58 children (86.6%) at the end of the treatment. Lost in the neighborhood and does not know how to get home was present in all the children who showed no improvement at the end of the treatment. The general health and physical development were not affected in any of the patient (Tables 10 to 18).

Therapeutic effect of the treatment on MMSE reveals that it is having significant effects on orientation, attention, and concentration, recall, language and on total score. It is having insignificant effects on Registration and sensory perception after completion of the active treatment, i.e., at the end of 84th day. Follow-up study, i.e., at the end of 14th week (after 98 days) reveals that the drugs are continuing their significant effect on orientation, recall, language and on total score, whereas it is having no significant effect on attention and concentration, registration and sensory perception (Tables 19 and 20).

The observations done on laboratory parameters infer that the *Brahmi ghrita* and *Jyotishmati Taila* are absolutely safe to be used in cognitive deficit children as there were no significant changes in almost all laboratory parameters statistically (Tables 21 and 22).

DISCUSSION

Cognitive deficit is a disorder of children with major impact on their learning ability which is generally influenced by intelligence, memory and adequate social atmosphere which are responsible for the proper development of a child. Difficulties in behavioral personality or adaptive functioning tend to exacerbate learning problems. Children with learning disabilities pay less attention than normal learners and this cannot be attributed to IQ alone. To be a good learner, a child must have less fluctuation of attention, increased the power of concentration, spontaneity in word recognition and capacity to memorize things quickly and correctly.[12]

Ingredients of *Brahmi ghrita*, viz. *Brahmi* (*B monnieri*), *Vacha* (*Acorus calamus L.*), *Kushtha (Saussurea lappa Clarke), Shankhapushpi (Convolvulus pluricaulis choisy)* and *Ghrita* are known *Medhya* drugs. To enhance cognitive function is a primary therapeutic use of *Becopa monnieri*.

Table 10: "Asks the same question repeatedly" wise distribution of 67 patients

Asks the same question repeatedly		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th Day*	*Follow-up at the end of 14th week*
No	No. of patients	53	53	53	53	53	54	54	55
	%	79.1	79.1	79.1	79.1	79.1	80.6	80.6	82.1
Yes	No. of patients	14	14	14	14	14	13	13	12
	%	20.9	20.9	20.9	20.9	20.9	19.4	19.4	17.9
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 11: "Decreased learning ability" wise distribution of 67 patients

Decreased learning ability		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	0	0	0	2	4	4	25	27
	%	0.0	0.0	0.0	3.0	6.0	6.0	37.3	40.3
Yes	No. of patients	67	67	67	65	63	63	42	40
	%	100.0	100.0	100.0	97.0	94.0	94.0	62.7	59.7
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 12: "Inability to meet the educational demands at school" wise distribution of 67 patients

Inability to meet the educational demands at school		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	0	0	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yes	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 13: Showing "lack of curiosity"

Lack of curiosity		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	0	0	11	25	49	57	59	59
	%	0.0	0.0	16.4	37.3	73.1	85.1	88.1	88.1
Yes	No. of patients	67	67	56	42	18	10	8	8
	%	100.0	100.0	83.6	62.7	26.9	14.9	11.9	11.9
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

(Nathan PJ, Clarke J, et al.). The chronic effects of an extract of *Bacopa monniera* (*Brahmi*) on cognitive function in healthy human subjects.[13,14] *Pratimarsha nasya* is the specific treatment for the disease of the head and neck primarily related to the brain as this route provides direct administration of the drug to the brain escaping the necessity of the drug to cross the blood-brain barrier. Hence it gives significant improvement in short duration. *Jyotishmati* (*Celastrus paniculata*) is also *Medhya* drug (memory booster/neuro regenerator). It stimulates a significant decrease in the brain levels of malondialdehyde, with simultaneous significant increases in levels of glutathione and catalase. The findings of research study indicate that the aqueous extract of *C. paniculata* possess cognitive-enhancing properties and an antioxidant effect.[15]

Table 14: "Language skills" wise distribution of 67 patients

Language skills (communication) retarded		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	23	23	24	24	24	25	27	27
	%	34.3	34.3	35.8	35.8	35.8	37.3	40.3	40.3
Yes	No. of patients	44	44	43	43	43	42	40	40
	%	65.7	65.7	64.2	64.2	64.2	62.7	59.7	59.7
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 15: Poor attention span

Poor attention span		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	3	3	29	33	41	53	58	58
	%	4.5	4.5	43.3	49.3	61.2	79.1	86.6	86.6
Yes	No. of patients	64	64	38	34	26	14	9	9
	%	95.5	95.5	56.7	50.7	38.8	20.9	13.4	13.4
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 16: Inability to understand and follow directions

Inability to understand and follow directions		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	7	7	6	6	5	5	8	9
	%	10.4	10.4	9.0	9.0	7.5	7.5	11.9	13.4
Yes	No. of patients	60	60	61	61	62	62	59	58
	%	89.6	89.6	91.0	91.0	92.5	92.5	88.1	86.6
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 17: "Gets lost in own Neighborhood and does not know how to get home" wise distribution of 67 patients

Gets lost in own neighborhood and does not know how to get home		*Assessment stage*							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100
Yes	No. of patients	0	0	0	0	0	0	0	0
	%	0	0	0	0	0	0	0	0
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Brahmi ghrita and *Jyotishmati taila* in the management of cognitive deficit showed good responses in the symptom, lack of curiosity from 100 to 11.9%, poor attention from 95.55 to 13.9%, moderate responses in decreasing learning activity from 100 to 59.7%, mild response in the symptom of retarded language skill from 65.7 to 59.7%, symptom of asking the same questions repeatedly from 20.9 to 17.9%, symptom of inability to understand and follow the directions from 89.6 to 86.6%. No response was observed in the symptoms like meet educational demands in school and lost in the neighborhood and does not know how to get home.

Brahmi ghrita and *Jyotishmati Taila* contain drugs which are having *Medhya Prabhava*.[16] It increases *Medha*

Table 18: "General Health and physical development affected" wise distribution of 67 patients

General health and physical development affected		Assessment stage							
		Baseline	*14th day*	*28th day*	*42nd day*	*56th day*	*70th day*	*84th day*	*Follow-up at the end of 14th week*
No	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100
Yes	No. of patients	0	0	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	No. of patients	67	67	67	67	67	67	67	67
	%	100	100	100	100	100	100	100	100

Table 19: Effect of therapies on MMSE after completion of the treatment (on 84th day)

		Mean score with SD		
Sl.No	*MMSE Clinical Parameters*	*BT*	*AT*	*p*
1.	Orientation	9.03 (1.467)	11.0 (1.038)	<0.001
2.	Attention and concentration	3.33 (0.730)	3.64 (0.671)	0.011
3.	Registration and sensory perception	2.89 (0.310)	3.00 (0.000)	0.072
4.	Recall	2.73 (0.449)	2.94 (0.240)	0.001
5.	Language	10.92 (0.664)	11.73 (0.449)	<0.001
6.	Total score	28.85 (1.891)	32.30 (1.626)	<0.001

Table 20: Effect of Therapies on MMSE at follow-up (at the end of 14th week/98 days)

		Mean score with SD		
Sl.No	*MMSE clinical parameters*	*BT*	*AT*	*p*
1.	Orientation	9.03 (1.467)	11.30 (1.081)	<0.001
2.	Attention and concentration	3.33 (0.730)	3.59 (0.723)	0.102
3.	Registration and sensory perception	2.89 (0.310)	3.00 (0.000	0.072
4.	Recall	2.73 (0.449)	2.92 (0.267)	<0.002
5.	Language	10.92 (0.664)	11.74 (0.441)	<0.001
6.	Total score	28.85 (1.891)	32.56 (1.675)	<0.001

and *Buddhi* (cognitive functions) which causes *Samprapti Vighatana,* i.e., breaking of pathogenesis to help in the treatment of cognitive deficit. This improvement may be due to *Samprapti Vighatana* of the disease (breaking the pathogenesis)–cognitive deficit. *Brahmi ghrita* and *Jyotishmati Taila having Kapha-Vataghna* properties which imply that these drugs clear the obstructed channels of *Manovahasrotas* by which these drugs may be helping in reducing the symptoms of the cognitive deficit and improves MMSE scores. *Vata* is considered as the controller of the mind. Pacification of the *Vata* also plays an important role in the action of the drugs.

The brain and CSF are separated from the blood by blood brainbarrier. Lipid-soluble substances pass readily through this membrane whereas non-lipid soluble substance and proteins enter the brain much more slowly. The lipophilic action of ghee and taila facilitates the transportation of its content to the brain and nervous

Table 21: Laboratory parameters (hematology)

Parameters	*Assessment stage*	*N*	*Mean*	*Std. deviation*	*t-value*	*p-value*
Hemoglobin (gm/dL)	Baseline	67	12.751	1.5057	1.361	0.178
	84th Day	67	12.640	1.4763		
TLC / cu.mm.	Baseline	67	8494.03	2091.605	0.150	0.881
	84th Day	67	8523.88	2167.745		
N%	Baseline	67	54.16	15.665	0.629	0.531
	84th Day	67	55.40	13.155		
E%	Baseline	67	3.82	3.676	0.429	0.669
	84th Day	67	4.01	3.570		
B%	Baseline	67	0.16	0.412	0.652	0.517
	84th Day	67	0.12	0.409		
L%	Baseline	67	39.96	14.607	0.631	0.530
	84th Day	67	38.76	12.766		
M%	Baseline	67	1.90	1.458	0.819	0.416
	84th Day	67	1.70	1.477		
ESR mm (at the end of 1st hour)	Baseline	67	14.90	11.227	0.030	0.976
	84th Day	67	14.87	11.116		

Table 22: Laboratory parameters (biochemistry)

Parameters	*Assessment stage*	*N*	*Mean*	*Std. deviation*	*t-value*	*p-value*
Blood urea (mg/dL)	Baseline	67	21.24	4.606	2.313	0.024
	84th day	67	19.54	5.403		
Serum uric acid (mg/dL)	Baseline	67	3.733	0.9351	0.250	0.803
	84th day	67	3.713	0.9708		
Serum Creatinine (mg/dL)	Baseline	67	0.607	0.0745	-1.199	0.235
	84th day	67	0.622	0.1085		
SGOT (AST) (karmen units/dL)	Baseline	67	31.75	7.241	1.267	0.210
	84th day	67	30.72	6.070		
SGPT (ALT) (karmen units/dL)	Baseline	67	15.55	4.970	-2.362	0.021
	84th day	67	17.57	8.452		
Total protein (gm/dL)	Baseline	67	7.270	0.4145	2.976	0.004
	84th day	67	7.13	0.376		
S. Albumin (gm/dL)	Baseline	67	4.352	0.1829	4.585	0.000
	84th day	67	4.255	0.1948		
S. Globulin (gm/dL)	Baseline	67	2.918	0.4393	0.936	0.353
	84th day	67	2.878	0.4022		
A/G ratio	Baseline	67	1.527	0.2472	1.384	0.171
	84th day	67	1.484	0.3058		
Conjugated bilirubin (mg/dL)	Baseline	67	0.071	0.0483	2.353	0.022
	84th day	67	0.0607	0.04547		
Unconjugated bilirubin (mg/dL)	Baseline	67	0.398	0.2061	2.665	0.010
	84th day	67	0.4406	0.24086		
Serum alkaline phosphatase (K.A. units)	Baseline	67	266.21	71.286	1.370	0.175
	84th day	67	262.06	72.435		

system. For the same reason, *Ghrita, Taila*, and the formulations of these facilitates an easy entry of the medicine to the target brain cells and act on the brain cells to improve the cognitive functions and MMSE scores in cognitive deficit children. The therapeutic effect on MMSE shows that the drugs are having significant effect on all symptoms except, registration and sensory perception at the end of the treatment (at the end of 84th day). The follow-up study (at the end of 14th week/98 days) on MMSE shows a significant effect on all symptoms except < attention and concentration and registration and sensory perception.

CONCLUSION

Cognitive deficit is a known disorder in children. It can be understood and treated in relation to *Medha* and *Buddhi* in Ayurvedic terminologies. Classical formulations of

Medhya drugs mentioned in Ayurvedic classics, *Brahmi ghrita* (internally) and *Jyotishmati taila nasya* in cognitive deficit children showed good responses in the symptom, lack of curiosity from 100 to 11.9%, poor attention from 95.55 to 13.9%, moderate response in decreasing learning activity from 100 to 59.7%, mild response in the symptom of retarded language skill from 65.7 to 59.7%, symptom of asking the same questions repeatedly from 20.9 to 17.9%, symptom of inability to understand and follow the directions from 89.6 to 86.6%. No response was observed in the symptoms like meet educational demands in school and lost in the neighborhood and does not know how to get home. It also improved the MMSE scores in cognitive deficit children. Further research can be initiated by taking into account the specific causative factor or a specific component of cognitive deficit to establish the core effect of these classical formulations.

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हिंदी सारांश

बच्चों में संज्ञात्मक घाटे के प्रबंधन में ब्राह्मी घृत और ज्योतिष्मती तैल का नैदानिक मूल्यांकन

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भूमिकाः अनुभूति मानसिक कामकाज की अवधारणात्मक और बौद्धिक पहलुओं को दर्शाता है। बुद्धि से संज्ञात्मक प्रकिया के अभाव का परिणाम अनुभूति की कमी या संज्ञात्मक कमी कहलाती है।

उद्देश्यः वर्तमान अध्ययन में, संज्ञानात्मक घाटे में ब्राह्मी घृत और ज्योतिष्मती तैल की प्रभावकारिता का मूल्यांकन किया गया है।

सामग्री एवं विधिः संज्ञानात्मक घाटे के नैदानिक लक्षणों पर प्रभाव का मूल्यांकन और छोटे मानसिक स्थिति परीक्षा (Mini Mental Scale Examination) में बदलाव के लिए ब्राह्मी घृत को खाने से पहले गर्म पानी/दूध के साथ 10 ग्राम दिन मे दो बार दिया जाता है और ज्योष्मती तैल को नाक में (दो–दो बूँद) दिन में दो बार, बारह सप्ताह तक डाला जाता है। इस संस्थान के वाह्य रोगी विभाग से 76 संज्ञात्मक घाटे (बुद्धि–मन्दता) के बच्चों को लिया गया।

परिणामः चिकित्सा अनन्तर व्याधि लक्षणों में अन्तर के उत्साहजनक परिणाम है जैसे–जिज्ञासा की कमी में 100% से 11.9%, अवधान की कमी में 95.55% से 13.4%, पढ़ाई की कमी में 100% से 59.7% कम प्रतिक्रिया पाया गया, भाषा की कुशलता में बहुत कम 65.7% से 59.7% प्रतिक्रिया पाया गया, एक ही प्रश्न को बार–बार पुछने में 20.9% से 17.9% और सूचनाओं को समझकर अनुसरण करने का सामर्थ्य में 89.6% से 86.6% पाया गया। स्कूलों में शैक्षणिक मांग को पूरा करने की प्रक्रिया में कोई बदलाव नही था। पड़ोस में चले जाने पर घर वापस आने की प्रक्रिया में कोई बदलाव नही था। इस अध्ययन के 84 वें दिन के अंत में पंजीकरण और संवेदी धारणा को छोड़कर एमएमएसई के सभी लक्षणों पर महत्वपूर्ण प्रभाव पाया गया है। अनुवर्ती अध्ययन में (14 सप्ताह के अनन्तर अध्ययन में) ध्यान व एकाग्रता और संवेदी धारणा पर प्रभाव नगण्य पाया गया। प्रयोगशालीय मापकों में कोई महत्वपूर्ण परिवर्तन नहीं मिला।

निष्कर्षः अतः यह निष्कर्ष निकलता है कि, इन औषधियों का प्रयोग सुरक्षित है और संज्ञानात्मक घाटे के बच्चों में नैदानिक लक्षणों में सुधार के लिये प्रभावी हैं।