

## EFFECTS OF CERTAIN ADRAVYABHUTA CHIKITSA IN RESTORING COGNITION IN CHILDREN

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### ABSTRACT

Cognition involves various mental actions such as memory, attention, language ability, reasoning, problem solving, decision making etc. Out of these memory is the fundamental component of learning and it affects other mental actions immensely. Hence in current study, memory, attention and language ability were used as assessment parameter to verify the effects of certain Adravabhuta chikitsa (Non-drug therapy) of Ayurveda in children. This study comprises chanting of "Om" mantra and shirodhara (pouring of milk on forehead) as Adravabhuta chikitsa. Weschler's Intelligence scale in children (WISC), Draw-a-man test and Vernier chronoscope were the assessment criteria adopted for the study. Both the therapies showed statistically significant result in almost all the spheres of memory and attention.

### KEY WORDS

Cognition, Memory, WISC, Om-mantra chanting

### INTRODUCTION

Cognition is a group of mental performances which involves memory, attention, producing and understanding language, reasoning, problem Solving and decision making<sup>1</sup>. Resoration of Cognition needs the appropriate functioning of these components. Out of these memory plays a key role and affects other mental processes. It is the ability to memorize the information which is previously acquired and stored. In *Ayurveda*, memory can be termed as *Smriti* which is an ability of an individual to recall the things that are directly perceived, heard and experienced<sup>2</sup>.

In perspective of cognition there are certain treatment procedures in *Ayurveda* which are undoubtedly helpful in the enhancement and restorative effect of memory, attention and various other processes. Out of which, certain *adravyabhuta chikitsa* ( Non-drug therapy) like

chanting of *OM mantra* and *panchakarma* procedures like *shirodhara* have proved highly effective in making equilibrium among *tridoshas*, *trigunas* and *manovaha strotas* and consequently effective in improving memory with other cognitive processes.

Therefore in current study we aimed to verify and provide an update of the practical implication of *Adrvyabhuta chikitsa* in the management of restoration of cognition in children.

### AIMS AND OBJECTIVES OF THE STUDY

- To enhance the mental performance.
- To get relief from the problem associated with memory.
- To improve school performance by achieving positive impact on memory status of child.
- To verify the efficacy of non-drug therapy in restoring cognition w.s.r. to different Ayurvedic Classics.

## MATERIAL AND METHODS

### Selection of Cases

- **Source** -Children for the present study were screened out from OPD/IPD of Balroga, Department of National Institute of Ayurveda, Jaipur and from various schools, situated in Jaipur by survey method.
- **Age group** -Children between 6 to 16 years were considered for the study.
- **Numbers of cases**- Total 52 children were registered out of which 12 children discontinued the treatment.
- **Grouping of patients**-Selected children were randomly divided into following two groups keeping in mind that both the groups had children from various grades (classes), schools and socio-economics status.

**Group A** - 20 cases treated by meditation through "Chanting of OM" mantra.

**Group B** - This group of 20 cases were treated by Shirodhara therapy (Ayurvedic Panchkarma Technique)

### DIAGNOSTIC CRITERIA

#### Inclusion Criteria

- Children aged 6-16 years of either sex satisfying, criteria.
- Children with average /normal I.Q.

#### Exclusion Criteria

- Children with physical disability.
- Children with psychiatric illness.
- Children with gross brain damage causing mental retardation
- Children with any genetic disorder.
- Children able to recall digit span of more than 9 digits.

#### Discontinuation Criteria

- Any acute or severe illness.
- Parents not willing to continue the therapy.

## OBSERVATION AND RESULTS

### Assessment criteria

- **Intelligence scale**

Wechsler intelligence scale for children (WISC) was adopted for its following subtest.

#### i) Working Memory index (WMI) which includes

- **Digit span – to testify** auditory short term memory and focused attention.
- **Letter number sequencing**-Auditory STM, focused attention, sequential memory, visualization ability and language ability.

#### ii) Processing speed index (PSI) which includes

- **Coding- Visual S.T.M.**
- **Symbol search** -short term memory, visual motor skill, speed and motivation.
- **Draw-a-man test for IQ -assessment.**
- **Memory scale** - P.G. I memory scale for Long Term Memory test.
- **Reaction time** - Vernier chronoscope (Electronic) for assessment of reaction time and attention span.

### METHOD OF ADMINISTRATION

#### Shirodhara<sup>3</sup> (ksheerodhara)

This specific technique of shirodhara includes the pouring of simple cow milk over the forehead of patient in the form of regular stream from a specific height of 8 cm in a fixed form of oscillatory movements, i.e. to and fro movement up to 30-45 minutes daily for 2 weeks.

#### "Om" mantra meditation<sup>4</sup>

The meditation group children were first taught the procedure of "OM" mantra meditation and then they were undergone through the 10 min session daily regular for 15 day's meditation schedule. This method was planned to verify the efficacy of non-drug therapy (Adravayabhuta Chikitsa) on memory status with special reference to different Ayurvedic Samhitas.

**Table no.1: Pattern of clinical improvement in tests applied in Digit Span**

Groups	N	Mean		Dif.	% of Change	SD	SE (±)	t	p	Remark
		BT	AT							
A	20	17.30	16.15	1.15	6.65	3.98	0.89	1.29	>0.10	Insigni.
B	20	15.10	12.15	2.95	19.54	3.59	0.80	3.67	<0.01	Signi.

As evident in above table, group A which is meditation group shows statistically insignificant result ( $P > 0.10$ ) with gain percent 6.65% while group B which is a shirodhara group shows statistically significant result ( $P < 0.01$ ) with gain percent 19.54%.

According to our assumption, group A should show significant result but if it's not so an extensive study should be performed with large sample and for longer duration.

**Table no.2: Showing pattern of clinical improvement in coding**

Groups	N	Mean		Dif.	% of Change	SD	SE (±)	t	p	Remark
		BT	AT							
A	20	63.15	53.30	9.85	15.60	6.57	1.47	6.70	<0.001	Highly signi.
B	20	38.15	30.15	8.00	20.97	7.50	1.68	4.77	<0.001	Highly signi.

Above table shows, group A and B both having statistically highly significant result ( $P < 0.001$ ) with gain percent 15.60% and 20.97% resp. This shows that Adravayabhuta chikitsa is effective in visual short term memory and attention span.

**Table no.3 showing pattern of clinical improvement in Symbol search**

Groups	N	Mean		Dif.	% of Change	SD	SE (±)	t	p	Remark
		BT	AT							
A	20	32.75	27.30	5.45	16.64	6.44	1.44	3.78	<0.01	Signi.
B	20	25.20	23.35	1.85	7.34	4.28	0.96	1.93	<0.10	Insigni.

As per table no.3 group A shows statistically significant result ( $P < 0.01$ ) and group B shows insignificant result ( $P < 0.10$ ) which reflects chanting 'Om' mantra is effective in short term memory, visual motor skill, speed and motivation.

**Table no.4: Showing pattern of clinical improvement in Letter-Number sequencing.**

Groups	N	Mean		Dif.	% of Change	SD	SE (±)	t	p	Remark
		BT	AT							
A	20	18.25	15.55	2.70	14.79	4.07	0.91	2.97	<0.01	Signi.
B	20	16.20	13.30	2.90	17.90	3.71	0.83	3.49	<0.01	Signi.

**Table no.4** reflects group A and group B, both showing statistically significant effect ( $P < 0.01$ ) with gain percent 14.79 and 17.90%. This may indicate both the procedures are useful in working memory problems.

**Table no.5: Showing pattern of clinical improvement in Long term memory test**

Groups	N	Mean		Dif.	% of Change	SD	SE ( $\pm$ )	t	p	Remark
		BT	AT							
A	20	12.45	11.35	1.10	8.84	2.38	0.53	2.07	<0.10	Insigni.
B	20	10.95	9.24	1.25	11.42	2.31	0.52	2.42	<0.05	Signi.

Group B shows statistically mild significant effect ( $P < 0.05$ ) with gain percent 11.42% while group A shows insignificant effect ( $P < 0.10$ ). This may suggest the therapies should also prolonged for few more days for longer action potential of neuronal pathway & stronger consolidation of information.

**Table 6: Showing pattern of clinical improvement in IQ test**

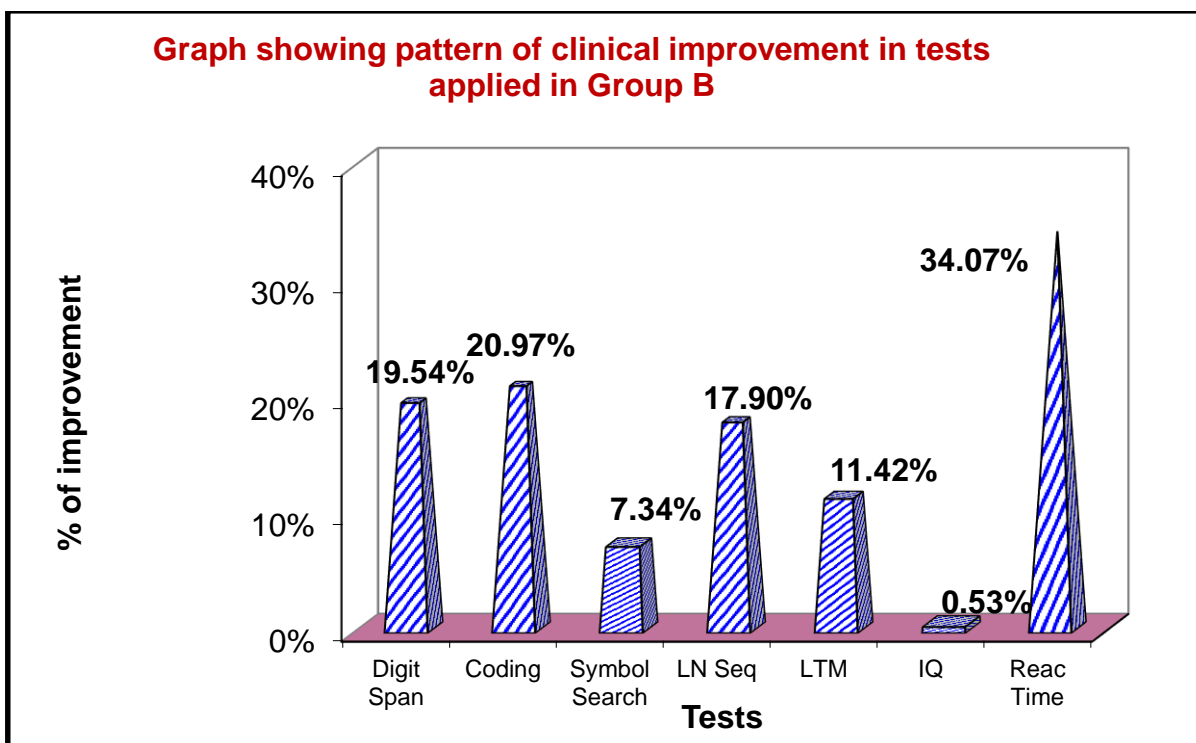
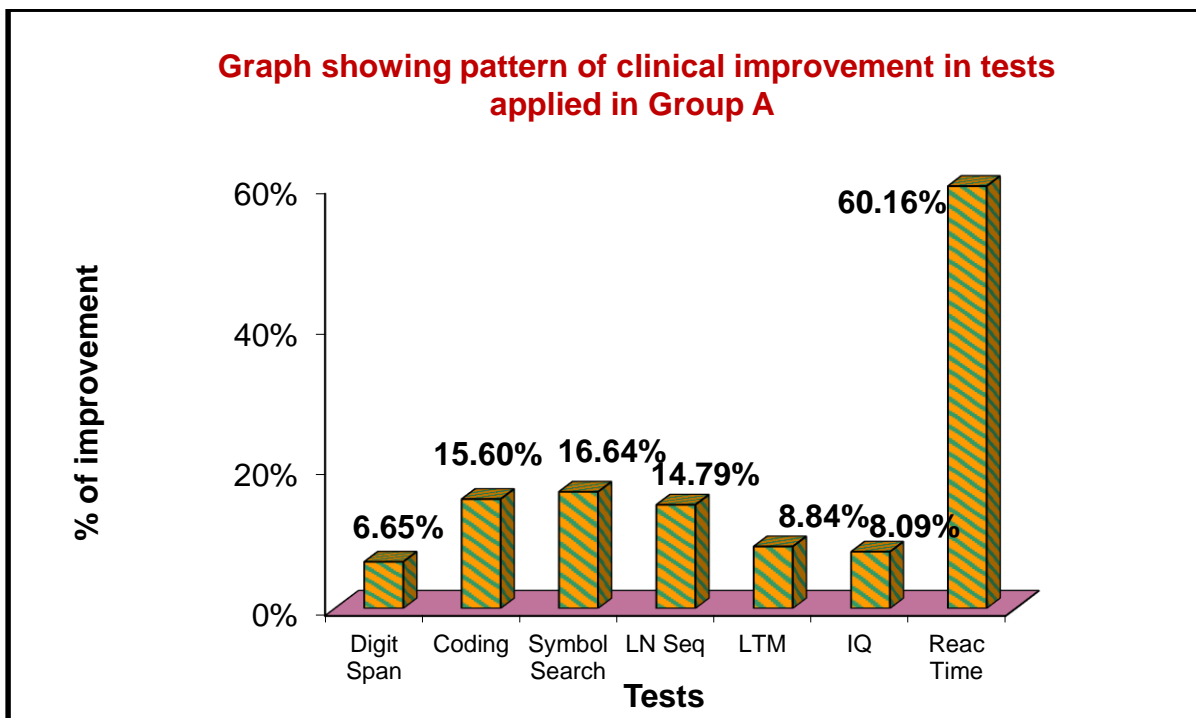
Groups	N	Mean		Dif.	% of Change	SD	SE ( $\pm$ )	t	p	Remark
		BT	AT							
A	20	97.00	89.15	7.85	8.09	13.20	2.95	2.66	<0.02	Signi.
B	20	94.55	94.05	0.50	0.53	4.52	1.01	0.49	>0.10	Insigni

Above table shows group A has statistically significant effects ( $P < 0.02$ ) in IQ test with very less gain percent 8.09% and group B shows insignificant effect ( $P > 0.10$ ). This may suggest that both procedures should prolonged for few more days.

**Table 7: Showing pattern of clinical improvement in Reaction time test**

Groups	N	Mean		Dif.	% of Change	SD	SE ( $\pm$ )	t	p	Remark
		BT	AT							
A	20	0.51	0.21	0.31	60.16	0.16	0.04	8.56	<0.001	Highly signi.
B	20	0.61	0.40	0.21	34.07	0.16	0.03	5.95	<0.001	Highly signi.

Above table shows both the procedures are statistically highly significant ( $P < 0.001$ ) in reaction time which shows that Adryavyabhuta Chikitsa are very effective in enhancing attention span of an individual.



**Discussion regarding probable mode of action Shirodhara**

The probable mode of action of *shirodhara* can be explained considering the following facts-

When a constant stream of any liquid is poured over the forehead from a fixed height it results in pressure on the skin over the forehead. This pressure stimulates the pacinon or mechanoreceptors present on the skin, which in

turn lead to mechanical deformation of the receptors, which result in the change in the membrane potential of the receptor and a receptor potential is generated.<sup>5</sup>

The receptor potential then leads to generation of action potential, which is then passed to the cerebral cortex via brain stem or the RAS. In this way the information from outside of reaches finally to the cerebral cortex which comprises areas of various cognitive functions<sup>5</sup>. The pressure input from the skin over the head region is conveyed by the ophthalmic branch of trigeminal nerve to the reticulospinal neurons via a disynaptic pathway<sup>6</sup>.

When sensory information reaches the cerebral cortex, only a small fraction of that information causes an immediate motor response. Much of the remainder is stored for future control of motor activities and for use in higher order cognitive functions such as conceptualization of thoughts, reasoning, decision making etc.<sup>5</sup>

Repeated stimulus input leads to consolidation of the information, which needs 5 to 10 minutes for minimal consolidation and 1 hour or more for stronger consolidation<sup>5</sup>. This fact is consistent with duration of *shirodhara* of 30-45 minutes practiced daily. To achieve permanent effect of *shirodhara*, there must be change in response characteristics of different neuronal pathways and to attain this, activation of the second messenger pathway is needed which might be attained through the process of *shirodhara*.

The process or the mode of action here is similar to that of neuro-feedback or the EEG bio-feedback technique, in which individuals are provided with real time feedback about their brainwave activity and taught to use that information to modulate certain aspects of their mind.

In an animal study, it was found that, the responses evoked by stimulation of either the head or the tail were three or four times larger

than those elicited by mid body stimulation<sup>7</sup>. Thus it may be interpreted that same response is true with the man. This point explains why *dhara* on forehead is more effective for mental disorders.

Finally, it can be concluded that *shirodhara* may simply be a specific way of changing the excitabilities in dysfunctional circuits of the brain so that to make the individual to perform normally.

#### **Probable mode of action of Om mantra meditation**

Om mantra meditation causes various changes in brain having neurophysiological<sup>8</sup>, neurochemical and neuro-electrical effects. Brain waves are associated with different mental processes e.g. Alpha patterns of brain waves are associated with relaxation, visualization and creativity, theta patterns are associated with attention, intuition and memory while beta patterns are associated with alertness, cognition and concentration<sup>9</sup>. The primary findings of several meditation studies have implicated increase in theta, alpha and delta band power and decreases overall frequency<sup>10, 11, 12, 13</sup>

These studies help to conclude the fact that the brain wave activity is affected by "Om" mantra meditation which may alter the long term neuro-electric profile and improve the human cognition.

#### **CONCLUSION**

Multimodal approach of certain Ayurvedic procedures including Shirodhara, and Om mantra meditation (Adravyabhuta chikitsa) can be effectively used in management of restoration of memory.

Shirodhara and Om meditation, both have shown efficacy in all areas like working memory, processing memory, visualization, and visual-motor skill except IQ and LTM respectively which suggest the administration of procedures should be prolonged for few more days. Both the therapies showed highly significant improvement



in Reaction Time which directly reflects the efficacy of therapies on attention span. Further extensive study is needed to authenticate the results of the current study, with larger samples and more precise assessment criteria.

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