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SHATAPUSHPA CHURNA AS A MEMORY ENHANCER IN ADOLESCENT - A RANDOMISED CONTROLLED CLINICAL TRIAL

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ABSTRACT

Background - *Medhya rasayanas* are such great contribution by *Acharyas* to the maintain healthy mind, which can improve the quality of life by enhancing stress tolerance and memory. During childhood, skills and functional abilities are formed. Environmental and social influences, as well as genetic background and nutritional status, all have a role in psychological and physical development. If all the factors effectively take part together, there will be positive growth in an individual. **Aim -** To evaluate the effect of *Shatapushpa Churna* and compare its efficacy with *Brahmi Churna* in improving memory of adolescent. **Materials and Methods:** Total 30 participants were registered and they were divided into 2 groups as per computer generated randomization. In Group A, 15 participants were given with *Shatapushpa Churna* 6 grams twice a day with 1 teaspoon *Madhu* and 1/2 teaspoon *Ghrita* for 30 days and in Group B, 15 participants were given *Brahmi Churna* 6 grams twice a day with 1 teaspoon *Madhu* and 1/2 teaspoon *Ghrita* for 30 days. Clinical symptoms were assessed on 31st day. PGI memory scale was used for assessment of Memory. **Result:** These both *Ayurveda* internal medicines showed good results in memory enhancement. **Conclusion:** *Shatapushpa Churna* is found effective in overall memory specially with Recent memory, Remote Memory and Delayed Recall and had comparable results with *Brahmi Churna*.

KEYWORDS: *Shatapushpa churna, Brahmi churna, Medhya,* Memory, Smriti, Adolescent, PGI Memory Scale.

INTRODUCTION

Smriti is remembrance of things directly perceived through concentrated mind by hearing or experience earlier.[1] If the person is not able to grasp or retain the present events or experiences is called as *Smriti Bhramsha.*[2,3] *Ayurveda* is science where many herbomineral medicines are explained to improve the *smriti*.[4]

To control over mind and to improve the status of *smriti*, many herbal medications are explained in *Ayurveda*, such as *Medhya rasayana*[5] like *Bhrahmi, Shankhapushpi, Vacha, mandookaparni* etc. *Medhya rasayanas* are such great contribution by *acharyas* to maintain the healthy mind. In Kashyapa Samhita described Shatapushpa as Rasayana, promotes intellect with-in a month when given with honey and Ghee.[6,7]

In present competitive world in order to improve the performance of children in the schools, parents insisting the children to score more marks and which is leading to stressful conditions in children and lack of concentration and remembrance. This is leading to low score in the exams by which mental ailments in children and also in their parents. So here in this study it is an attempt to study the effect of *Shatapushpa Churna* and *Brahmi Churna* in improving *Smriti* (memory) of adolescent.

MATERIALS AND METHODS

A. Selection of patients: The ethical clearance for study was obtained from Institutional Ethics Committee (**KLE/BMK/MRC/698/2021**) and CTRI Registration no: **CTRI/2021/02/031105**. Subjects who were having low level memory or below average memory as per PGI memory scale, attending OPD and IPD of Department of *Kaumarabhritya*, KLE Ayurveda Hospital, Belagavi were registered, after taking proper informed assent and consent from participants and parents/guardian, for the present clinical study. Total of 30 participants fulfilling the inclusion criteria were enrolled and randomized into two groups (Trial group (A) and Control group (B)), with 15 patients in each group A and B using random number generator software.

Diagnostic Criteria

Diagnosis was based upon screening with PGI Memory Scale[8] for low level of memory and below average memory.

Inclusion Criteria

- Children of either sex between the age group of 14 years -16 years.
- Those children were diagnosed with low memory with screening test.
- Children who were brought to clinic predominantly with the complaint of poor memory.

Exclusion Criteria

- Children aged below 14 years and above 16 years.
- Child with Dementia.
- At the time of enrolment, if the child is found to be non-inclusive due to any underlying health condition or medication like sedatives, tranquilizers, antiepileptic drugs.
- Children with any chronic disease known case of Cerebral Palsy, k/c/o Profound Mental Retardation, k/c/o Autism, K/c/o ADHD, k/c/o Genetic and chromosomal abnormalities, k/c/o Learning disabilities, k/c/o Acute and chronic infections, k/c/o Metabolic disorders, k/c/o Covid 19 that can affect the brain directly or indirectly.

Intervention

In Group A *Shatapushpa Churna* 6 grams in 2 divided doses morning and evening (1hour before food) for 30 days with *Anupana* of 1 Teaspoon *Madhu* and ½ Teaspoon *Ghrita* was given. In Group B Brahmi Churna 6gm in 2 divided doses morning and evening (1hour before food) for 30 days with anupana of 1Teaspoon Madhu and ½ Teaspoon Ghrita. Total duration of study was 30 days. Trial drug was prepared in GMP certified KLE Ayurveda Pharmacy, Belagavi.

Criteria for assessment

PGI Memory Scale[8] was taken as subjective assessment criteria to observe the effect of *Shatapushpa Churna* on Memory enhancement.

Statistical Analysis

The following tests were used for statistical analysis, Man Whitney U test, Wilcoxon Matched Pairs Test, Dependent and Independent T Test.

OBSERVATIONS AND RESULTS

Total 30 patients were registered in the study and all of them completed the course of treatment.

Observation

The differences concerned with Age, Gender, Religion and Diet are attributed to randomization and flow of participants. There was no significant reason found for the difference in distribution of samples of the above observation.

RESULT

Effect of *Shatapushpa churna* on Memory enhancement through PGI Memory Scale

Although both the groups are showing comparable results but when overall mean difference values are compared, Group A shows better result than Group B. When it was compared with total PGI memory scores before and after treatment by independent t test in the Group A and Group B it was observed that in Group A, Before Treatment on day 1, it was 23.27 and After Treatment on day 31st was increased to 34.40 with mean difference of 11.13 and with p-value 0.0001. In Group B, Before Treatment on day 1 it was 26.80 and After Treatment on day 31st it was increased to 36.73 with mean difference of 9.93 and with p-value 0.0001.

When compared both the groups, in Group A it was found that the results were significant in parameters like in Remote memory with p-value- 0.0022, Recent memory p-value- 0.0022, Mental balance p-value- 0.0033, Attention and concentration p-value- 0.0033, Delayed recall p-value- 0.0022, Immediate recall p-value- 0.0033, Verbal retention for similar pairs p-value- 0.0026, Verbal retention for dissimilar pairs p-value- 0.0125, Visual retention p-value- 0.0033 and Recognition P-value- 0.0037. It was observed that the results were not significant in between the groups, which signifies that both the drugs acted equally and are comparable.

In Group B it was found that the results were significant in parameters like Remote memory with p-value- 0.0010, Recent memory p-value- 0.0015, Mental balance p-value- 0.0017, Attention and concentration p-value- 0.0015, Delayed recall p-value- 0.0128, Immediate recall p- value- 0.0067, Verbal retention for similar pairs p-value- 0.0022,Verbal retention for dissimilar pairs p-value- 0.0022, Visual retention p- value- 0.0164 and Recognition p-value- 0.0076.

From above results, it can be said that Grp A is better than grp B in parameters like Mental Balance, Delayed Recall, Immediate Recall, Visual Retention and Recognition While Grp B is better than grp A in Remote Memory, Recent Memory, Attention & Concentration and Retention for dissimilar pairs. In parameter of Retention for similar pairs both the drugs acted equally.

DISCUSSION

Interpretation of PGI memory scale before and after treatment

- ✓ Both groups are showing improvement in memory levels afterward treatment, although There was no significant difference between them before & after treatment.
- ✓ Before medication, there were no patients in the Average Memory level, 70% in the Below Memory level, and 30% in the low-level Memory. After treatment, there were 26.67% in the Average Memory level, 73.33% in the Below Memory level, indicating a shift of patients from lower to higher memory levels.

Relevance in clinical application

- ✓ After evaluating the results, based on the level of the components of memory like Mental balance, Delayed recall, Immediate recall and Visual retention and Recognition are to be addressed, *Shatapushpa* drug can be selected.
- ✓ If components of PGI memory scale like Remote memory, Recent memory, Attention and Concentration and Verbal retention for dissimilar pairs are to be addressed, then *Brahmi* drug can be opted.
- ✓ In case of verbal retention for similar pairs both drugs acted equally.

PROBABLE GENERAL MODE OF ACTION OF DRUGS

Mode of action of *Shatapushpa*

- *Medha* includes *Grahan shakti* (power of acquisition), *Dharan shakti* (power of retention), and *Smriti* (power of remembering). Since *Pitta* is *ashu* and *tikshna*, it is beneficial for *vishaya graham* and *Smriti*, which is why *Medha* is included in Pitta's *prakrit* karma.[9] *Vata* is also essential for the association of concepts in the *smriti* process. *Sthirita* and *Dhriti* are included in the *prakrit karma* of *Kapha*[10]
- The *dosha udana vata*, which resides in the ura, is involved in the process of acquiring *smriti*.[11] The other types of *dosha t*hat contribute to this cause are: Prana vata, which resides in the ura, maintains proper *buddhi*, *mana*, and *indriya* activity.[12]
- The appropriate functioning of buddhi and mana is the responsibility of Sadhaka pitta[13], who lives in Hrdaya. Tarpaka kapha in shira feeds and protects the brain's sense organ centres[14], and it maintains vata under control.
- On the basis of rasa panchaka and its influence on the agni and manovaha srotas, the drug's mode of action can be inferred to some extent.
- The tikta rasa, by its *Laghu, Guna, Dipana, Pachana* and *Sroto Visodhana Karma* cleanses the M*anovaha srotas.*[15]
- *The Katu rasa and Ushn virya* of the drug helps in expelling *Tamas* and vitiated *Kapha* from *Hrudaya and Manovahasrotas*, also causes *Agni Dipana* and helps in regulating the proper functioning of pachaka and sadhaka pitta. Triterpenoids component found in this drug has an anabolic action , which can be inferred as *agni vardhaka*.[16]
- According to Kashyapa, Madhura Rasa is 'Sadindriya Prasadaniya' and must have an action on the Indriyas'.
- *The prabhava of the drug is Medhya* Flavonoids serve to regulate hormone and enzyme release, which calms the nervous system. *The* Coumorine constituent act as neuro protective.[17] This drug *helps in* promoting learning acquisition and memory, which decreases the actions of amnestic agents and also results in positive effect on mental functions without undue stimulation.
- *Ghrutha and Madhu* were utilised as *Anupana*, a lipid media that allows the medicine to easily pass the blood-brain barrier, directly impacting multiple intelligence centres in the brain.[18]

• CONCLUSION

In the clinical trial involving 30 patients of adolescent age group between 14 to 16 years with one month of intervention, it can be concluded that *Shatapushpa Churna* is found effective in overall memory specially with Recent memory (P value- 0.0022), Remote Memory (P value- 0.0022) and Delayed Recall (P value- 0.0022) and the effect of *Shatapushpa Churna* and *Brahmi Churna* were comparable.

Assessment Tools:

Tables — Results of the study

Comparison of Group A and Group B with total PGI memory scores at before and after treatment by independent t test

Treatment	Group A		Group B		t-value	p-value
	Mean	SD	Mean	SD		
Before	23.27	5.78	26.80	6.21	-1.6133	0.1179
After	34.40	8.17	36.73	5.89	-0.8978	0.3770
Difference	11.13	5.34	9.93	4.01	0.6958	0.4923

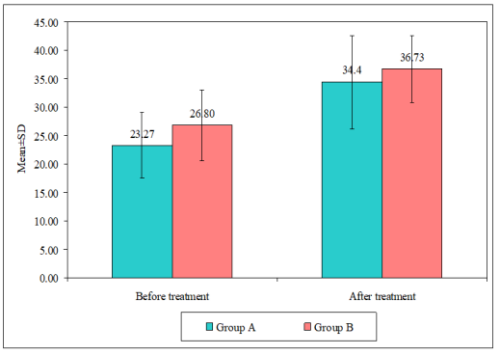

Figure: Comparison of Group A and Group B with total PGI memory scores at before and after treatment.

Table: Comparison of before and after treatment with total PGI memory scores in Group A and Group B by dependent t test.

Groups	Treatment	Mean	SD	Mean Diff.	SD Diff.	% of change	t-value	p-value
Group A	Before	23.27	5.78	-11.13	5.34	-47.85	-8.0696	0.0001*
	After	34.40	8.17					
Group A	Before	26.80	6.21	-9.93	4.01	-37.06	-9.5979	0.0001*
	After	36.73	5.89					

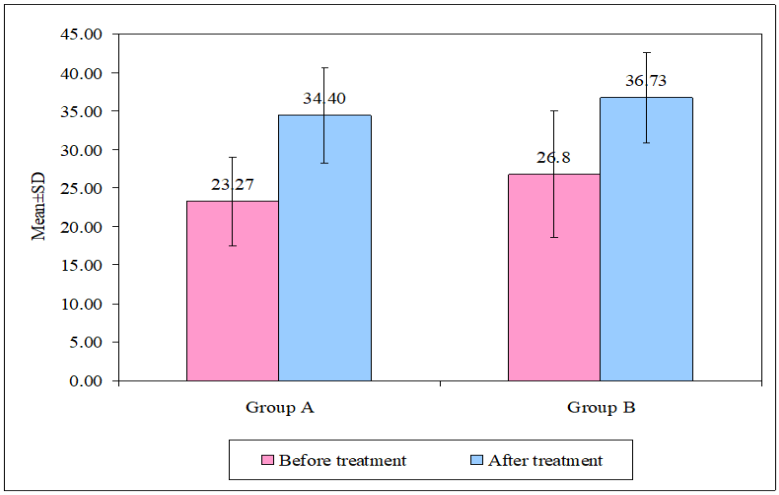

Figure: Comparison of before and after treatment with total PGI memory scores in Group A and Group B.

Table: Comparison of Group A and Group B with component scores of GI memory scale at before and after treatment by Mann-Whitney U test.

Components of PGI	Treatment	Group A			Group B			U-value	Z-value	p-value
		Mean	SD	Mean rank	Mean	SD	Mean rank			
Remote memory	Before	2.5	0.7	16.1	2.5	0.6	14.9	103.0	0.3733	0.7089
	After	3.4	0.6	14.3	3.5	0.5	16.7	94.0	-0.7466	0.4553
Recent memory	Before	2.1	0.6	15.9	2.1	0.7	15.1	107.0	0.2074	0.8357
	After	3.1	0.8	14.8	3.2	0.8	16.2	102.0	-0.4148	0.6783
Mental balance	Before	2.0	1.1	14.1	2.3	0.9	16.9	91.0	-0.8710	0.3837
	After	2.8	0.9	14.3	3.1	0.8	16.7	95.0	-0.7051	0.4807
Attention and concentration	Before	2.0	0.7	15.8	2.0	0.8	15.2	108.0	0.1659	0.8682
	After	2.9	0.8	15.2	3.6	2.5	15.8	108.0	-0.1659	0.8682
Delayed recall	Before	2.5	0.9	14.1	2.8	1.1	16.9	91.5	-0.8503	0.3952
	After	3.5	0.7	15.9	3.6	1.2	15.1	107.0	0.2074	0.8357
Immediate recall	Before	2.3	1.2	13.7	2.9	1.4	17.3	85.0	-1.1199	0.2628
	After	3.5	1.2	13.6	4.1	1.5	17.4	84.5	-1.1406	0.2540
Verbal retention for similar pairs	Before	2.0	0.8	14.0	2.3	1.0	17.0	90.0	-0.9125	0.3615
	After	3.3	1.3	13.8	3.6	1.0	17.2	87.0	-1.0370	0.2998
Verbal retention for dissimilar pairs	Before	3.4	1.5	17.2	2.7	1.6	13.8	86.5	1.0577	0.2902
	After	4.3	1.7	15.7	4.3	1.7	15.3	109.0	0.1244	0.9010
Visual retention	Before	2.9	1.8	13.9	3.5	1.6	17.1	88.0	-0.9955	0.3195
	After	3.9	1.9	13.2	4.6	1.3	17.8	77.5	-1.4310	0.1524
Recognition	Before	2.4	1.0	14.9	2.5	1.1	16.1	104.0	-0.3318	0.7400
	After	3.7	1.2	15.1	3.7	1.2	15.9	107.0	-0.2074	0.8357

Table: Comparison of before and after treatment with component scores of GI memory scale in Group A by Wilcoxon matched pairs test.

Components of PGI	Treatment	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Remote memory	Before	2.53	0.74					
	After	3.40	0.63	-0.87	0.52	-34.21	3.0594	0.0022*
Recent memory	Before	2.13	0.64					
	After	3.07	0.80	-0.93	0.59	-43.75	3.0594	0.0022*
Mental balance	Before	2.00	1.07					
	After	2.80	0.94	-0.80	0.56	-40.00	2.9341	0.0033*
Attention and concentration	Before	2.00	0.65					
	After	2.93	0.80	-0.93	0.70	-46.67	2.9341	0.0033*
Delayed recall	Before	2.53	0.92					
	After	3.53	0.74	-1.00	0.65	-39.47	3.0594	0.0022*
Immediate recall	Before	2.33	1.18					
	After	3.47	1.19	-1.13	0.83	-48.57	2.9341	0.0033*
Verbal retention for similar pairs	Before	2.00	0.85					
	After	3.33	1.29	-1.33	1.11	-66.67	3.0133	0.0026*
Verbal retention for dissimilar pairs	Before	3.40	1.45					
	After	4.33	1.72	-0.93	1.10	-27.45	2.4973	0.0125*
Visual retention	Before	2.93	1.79					
	After	3.87	1.88	-0.93	0.70	-31.82	2.9341	0.0033*
Recognition	Before	2.40	0.99					
	After	3.67	1.18	-1.27	1.10	-52.78	2.9003	0.0037*

Table: Comparison of before and after treatment with component scores of PGI memory scale in Group B by Wilcoxon matched pairs test.

Components of PGI	Treatment	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Remote memory	Before	2.47	0.64					
	After	3.53	0.52	-1.07	0.46	-43.24	3.2958	0.0010*
Recent memory	Before	2.07	0.70					
	After	3.20	0.77	-1.13	0.64	-54.84	3.1798	0.0015*
Mental balance	Before	2.33	0.90					
	After	3.07	0.80	-0.73	0.80	-31.43	2.5205	0.0117*
Attention and concentration	Before	2.00	0.85					
	After	3.60	2.53	-1.60	1.92	-80.00	3.1798	0.0015*
Delayed recall	Before	2.80	1.08					
	After	3.60	1.24	-0.80	0.94	-28.57	2.4895	0.0128*
Immediate recall	Before	2.93	1.44					
	After	4.13	1.46	-1.20	1.26	-40.91	2.7118	0.0067*
Verbal retention for similar pairs	Before	2.33	0.98					
	After	3.60	0.99	-1.27	0.96	-54.29	3.0594	0.0022*
Verbal retention for dissimilar pairs	Before	2.73	1.58					
	After	4.27	1.71	-1.53	1.46	-56.10	3.0594	0.0022*
Visual retention	Before	3.47	1.64					
	After	4.60	1.30	-1.13	1.55	-32.69	2.4006	0.0164*
Recognition	Before	2.53	1.06					
	After	3.73	1.16	-1.20	1.32	-47.37	2.6673	0.0076*

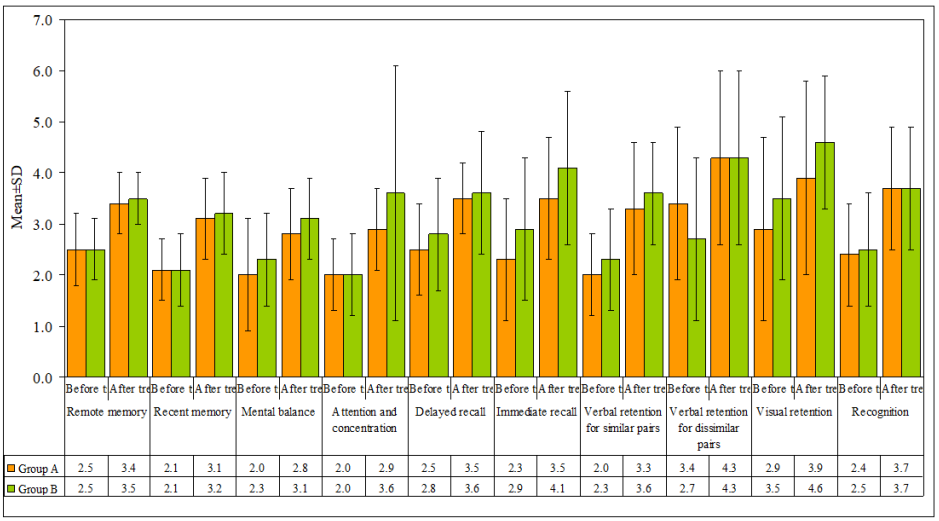

Figure: Comparison of Group A and Group B with component scores of PGI memory scale at before and after treatment

Table: Comparison of Group A and Group B with interpretation of PGI memory scale.

Interpretation	Group A	%	Group B		Total	%	χ^2	p-value
Before treatment								
Low level memory	6	40.00	3	20.00	9	30.00	1.4290	0.2320
Below average memory	9	60.00	12	80.00	21	70.00		
Average memory	0	0.00	0	0.00	0	0.00		
After treatment								
Low level memory	0	0.00	0	0.00	0	0.00	Yates 0.1700	0.6800
Below average memory	12	80.00	10	66.67	22	73.33		
Average memory	3	20.00	5	33.33	8	26.67		
Total	15	100.00	15	100.00	30	100.00		
Comparison of before and after	Wilcoxon matched pairs test, Z=2.6657, p=0.0078*		Wilcoxon matched pairs test, Z=2.5205, p=0.0117*					

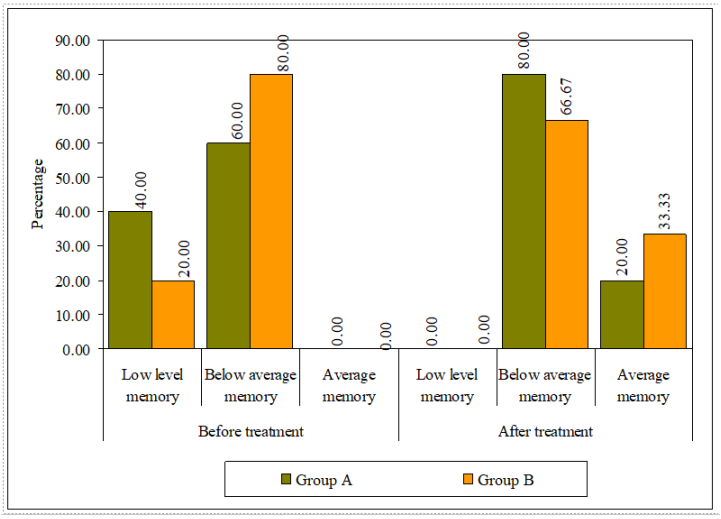

Figure: Comparison of Group A and Group B with interpretation of PGI memory scale.

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