



Research Article

CLINICAL EVALUATION OF VACHA RHIZOME (*ACORUS CALAMUS LINN*) AS MEMORY BOOSTER IN CHILDREN

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ABSTRACT

Medhya Rasayana, a rejuvenation therapy which comes under *Kamya Rasayana* which is one among 5 types of *Rasayana*. *Vacha* is one among such drugs which has *Smrutivardhan* activity, *Smruti vardhana* activity is comparable with memory boosting/enhancing activity. *Medhya* activity is inclusive of *Smruti* and hence in Ayurveda *Medhya* drugs do include one of their therapeutic aspects as *Smruti vardhana*.

Two groups of 20 volunteers are selected and Group A are given capsules containing *Vacha* rhizome fine powder each with a dose of 250mg twice a day for 48 days empty stomach and follow up was done on 96th day. Group B received placebo of cap Dextrin 250mg for same duration and time as of group A.

Vacha rhizome *Churna* show the better memory boosting activity in children in comparison with Dextrin. Statistically significant results were found in group A, observed between the results of 0th day and 96th day with $P < 0.01$ in subjective parameter for Memory Score in Test of memory for children, on 48th and 96th day none of the children were maintained in statusquo instead 70% (14 children), 80% (16 children) respectively showed better response on 48th and 96th day and good response was seen in 30% (06 children) and 20% (04 children) respectively on 48th and 96th day.

INTRODUCTION

In Ayurveda Health is defined as the state of equilibrium in *Dosha's*, *Dhatu's*, *Agni* and *Malas* along with pleasant status of *Mana*, *Indriya* and *Atma*,^[1] thus stressing the inseparability, inevitability & importance of the healthy mind as an integral component of health.

Prajna is a faculty of mind. *Dhee*, *Dhruti* and *Smruti* are *Prajna* components. *Smruti* literally means *स्मृतिः अतीतार्थविषयज्ञानं* ^[2] memory which is the capacity to recollect the object perceived, heard & experienced earlier. *Smruti* is one of the most essential factor for the attainment of knowledge. This is the knowledge of things directly perceived. Loss of *Smruti* is manifested when the *Rajo* & *Tamo gunas* overpower the *Satwa guna*^[3].

Memory is a specialized faculty of brain, which retains the wanted things developed during the process of learning^[4]. It is of two types as Recent and Remote. Recent memory may be lost by neurological disorders, where as remote memory is remarkably resistant and persistent. The importance of memory, the process of learning and progress of mankind is unquestionable and undisputed.

With the advancement in the field of education new techniques have been brought into practice in order to improve the performance of children in the schools. Often these also have increased physical and mental stress in children. In spite of these, still there are a few children who perform poorly by scoring below 50%. These children need help with *Smruti Vardhaka* oushadhis to improve the quality of learning and improve their school performance.

Criteria for the Selection of Drug - *Vacha*

Parents insisting and forcing the children to score more percentage may not be the solution. Sometimes repetitions, concentration and counselling will help. Though many medicines are mentioned in

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modern system of medicine like Aniracetam and Piracetam, these exhibit certain effect but often gives rise to adverse effects like Nausea, Vomiting and Anticholinergic effects etc. *Vacha* (*Acorus calamus* Linn) which is one of the most commonly used "*Medhya Rasayana*" mentioned by Kashyapa in Sutrasthana eighteenth chapter and also mentioned as one of the ingredients in some of the preparations like *Saraswatarista*, *Vachadi grita*, *Bramharasayan*, which are claimed to have *Smruti vardhana* action. Yogaratnakara quotes "*Sahasrashlokadharina*" in the context of *Guduchyadi rasayana yoga*^[5] in which *Vacha* is one of the ingredients. Acharya Sushruta also mentions *Vacha* in one of the *Yogas* in *Cikitsa sthana* quoting "*Smrutiman*"^[6] Which means if any individual who consumes *Vacha* for 48 days shall improve his memory. Hence this drug is taken up in this study to enhance the memory power of children.

OBJECTIVES

To evaluate the *Vacha* rhizome as a Memory booster in comparison with placebo (Dextrin) in school children and registered in OPD of Shri Jayachamarajendra Institute of Indian Medicine hospital, GAMC Bangalore-09

Study design

Group	Intervention	Dose	Time	Duration	Follow up
A	<i>Vacha</i> Rhizome <i>churna</i> (Capsule)	250 mg	Twice a day (before breakfast and dinner)	48 days	96 th day
B	Placebo (Dextrin - Mixture of Starch & Glycogen) (Capsule)	250 mg	Twice a day (before breakfast and dinner)	48 days	96 th day

Assessment

- All the children are assessed based on subjective parameters after the test is conducted on 48th day and 96th day and the changes in the performance were recorded.
- Children on the day zero were subjected to "Test of Memory for children" scale which includes the subjective parameters such as
 - School Test Performance
 - Improvement in Concentration
 - Improvement in Recollection
 - Memory Score
- After the completion of treatment on 48th day, test was repeated and changes were noted and again the "Test of Memory in children" was repeated on 96th day as follow up and noted the difference.
- Grading is given for all the subjective parameters as follows.
 - Statusquo - Poor (+)
 - Improved by 30-50% - Moderate (++)
 - Improvement more than 50% - Good (+++) on 0th, 48th and 96th day respectively.
- No objective parameters are taken into consideration in analysing the results of the drug.

The data obtained were analyzed using Paired and Unpaired student t test

OBSERVATIONS

Table 1: Incidence of Religion

Religion	Group A	Group B	Total %
Hindu	15	18	82.5% (33)
Muslims	05	02	17.5% (07)

MATERIALS AND METHODS

The children below 12 years studying in 6th standard were selected from Govt. Model Primary School Saneguruvana Halli, Basaweswar Nagar, Bangalore and registered in OPD of SJIIM hospital, GAMC Bangalore.

Inclusion Criteria

- Children who have performed poorly (below 50%) in school test.
- Children who have performed poorly in "Test of Memory for Children"^[7] scale developed by NIMHANS which is framed for children of age group 7-11years.
- Clinical evaluation of *Smruti vardhana* was done by repeating the memory test for children after 48th day and 96th day of treatment and memory score, teacher's assessment of children for concentration and recollection and their performance in school test were taken into account for clinical assessment.
- Sex of either gender written consent was obtained from the parents/guardians after explaining the study.

Exclusion Criteria: Children suffering from physical disability, child amnesia, epilepsy, learning disability, attention deficit hyperactive disorder.

Among the 40 volunteers Hindus accounted for 82.5% (33 Children) and Muslims 17.5% (07 children)

Table 2: Incidence of Sex

Sex	Group A	Group B	Total %
Male	08	04	30% (12)
Female	12	16	70% (28)

The above table shows the percentage of volunteers in each sex, girls were 70% (28) and boys accounted for 30% (12)

Table 3: Prakruthi wise Distribution

Prakruthi	Group A	Group B	Total %
Pitta Kaphaja	06	04	25% (10)
Vata Pittaja	09	05	35% (14)
Vata Kaphaja	11	05	40% (16)

Incidence of Vata Kaphaja prakruthi appears to be high accounting to 40% (16 children) and Vata Pittaja and Pitta Kaphaja accounts for 35% (14 children) and 25% (10 children) respectively.

RESULTS

Table 4: Showing the Mean values of Subjective Memory Score in Test of Memory for Children, in Trail group & Control group along with standard Error of mean.

Group	0 th Day	48 th Day	96 th Day
A	91.6 ± 2.311	106.42 ± 2.232	106.70 ± 1.296
B	97.31 ± 1.720	104.86 ± 2.278	100 ± 1.450

Within Group A

From the table of ANOVA it was seen that the changes occurred within the group A shows statistically highly significant results with P<0.001.

- i. The results observed on 48th day in Group A was statistically significant when compared with results of 0th day (P<0.001) in relation with Mean values of Memory Score in Test of Memory For Children, School Test Performance, Improvement in Concentration and Recollection observed by the teachers.
- ii. There is statistically non significance observed between the results of 48th and 96th day (P > 0.05).

iii. There was statistically significant change observed between the results of 0th day and 96th day (P<0.01).

Within Group B

- i. It was observed that results on 0th day and 48th day were statistically non-significant (P>0.05) in relation with mean values of memory score in Test of Memory for children, School Test Performance, Improvement in Concentration and Recollection observed by the teachers.
- ii. Statistically significant results were not observed between 48th and 96th day respectively & between the values of 0th day and 96th day (P>0.05).

Table 5: Comparative P Values and t Values Between Group A & Group B. From the table of Tukey's comparison test

Days	0 th Day	48 th Day	96 th Day
P Value	0.403	0.313	0.161
t Value	0.246	0.489	1.001

Statistically no significant change was observed between the values of 0th, 48th and 96th day, when compared between two groups. Since P values are found as 0.403, 0.313 and 0.161 respectively, where as "t" values are found as 0.246, 0.489 and 1.001 respectively.

Table 6: Showing the mean values of Subjective School Test Performance, in Trail group and Control group along with Standard Error of Mean

Group	0 th Day	48 th Day	96 th Day
A	43.62 ± 1.342	55.95 ± 2.464	62 ± 2.669
B	43.22 ± 1.092	44.55 ± 2.186	42.8 ± 0.819

1. With mean values of memory score statistically no significant change observed between the values on 0th, 48th and 96th respective days when compared.
 - a) No significant change observed between values on 0th, 48th day since P values are 0.40 and 0.061 respectively.
 - b) Statistically significant change was observed on 96th day between both groups with P value is < 0.004.

Table 7: Comparative P Values and t Values Between Group A & Group B. From the table of Tukey's comparison test

Days	0 th Day	48 th Day	96 th Day
P Value	0.409	0.061	----
t Value	0.231	1.574	----

Statistically no significant change was observed between the values of 0th, 48th and 96th day, when compared between two groups. Since P values are found as 0.409 and 0.061 respectively, where as “t” values are found as 0.231 and 1.574 respectively.

Table 8: Showing the improvement in mean values of Subjective concentration & recollection observed by the teachers, between and within the groups

S.No	Group A (<i>Vacha Churna</i>) Concentration & Recollection	Group A (<i>Vacha Churna</i>)			Group B (Placebo)		
		0 th Day	48 th Day	96 th Day	0 th Day	48 th Day	96 th Day
1	Statusquo	20 (100%)	-	-	20 (100%)	18 (90%)	18 (90%)
2	Good	-	06 (30%)	04 (20%)	-	02 (10%)	02 (10%)
3	Better	-	14 (70%)	16 (80%)	-	-	-



Fig 1 : Vacha Plant



Fig 2 : Vacha Inflorescence



Fig 3 : Vacha Dry Rhizome



Fig 4 : Vacha Rhizome Fine Powder



Fig 5 : Dextrin



Fig 6: Capsules of Vacha & Dextrin

Improvement in concentration and recollection observed by the teachers on the day 48 was 30% (06 children) and 70% (14 children) good and better respectively. On 96th day results were like 20% (04 children) and 80% (16 children) good and better respectively.

Between group A and group B the results found are as follows.

In Group B, on 48th day observation 90% (18 children) and 10% (02 children) was statusquo and good respectively and there was no improvement observed on 96th day.

While Group A, 48th and 96th day none of the cases were maintained in statusquo instead 70% (14 children), 80% (16 children) respectively showed better response on 48th and 96th day and good response was seen in 30% (06 children) and 20% (04 children) respectively on 48th and 96th day.

DISCUSSION

1. *Rasayan*, a branch one among the Astanga Ayurveda which deals with rejuvenation and restoring the bodily tissues^[8]. *Medhya rasayana* comes under *Kamya Rasayana* which is one among 5 types of *Rasayana*. *Vacha* is one among such drugs which has *Smrutivardhan* action, *Smruti vardhana* activity is comparable with memory boosting/enhancing activity. *Medhya* activity is inclusive of *Smruti* and hence in Ayurveda *Medhya* drugs do include one of their therapeutic aspects as *Smruti vardhana*.
2. All volunteers who fall under the category of school test performing below 50% in their exams were selected as per criteria, at the end of 48th day of the treatment the difference in performance is found statistically significant in Group A ($P < 0.01$) where as it is non-significant in group B ($P > 0.05$). Cases were followed up to 96th day of the completion of treatment.

When they were screened on 96th day the response shown on 48th day had improved in some cases 50% (10 children) in group A, where as in group B, the response shown on 48th day had fallen back almost to the levels of 0th day score and the effect of medicine was not seen in their follow-up period till 96th day. Both group A and group B were observed statistically non-significant in their follow-up period

There was statistically significance is found in group A comparatively between group A and group B with the results of 96th day score ($P < 0.001$) this shows the drug has sustained its efficacy even after the drug is withdrawn.

3. The results with reference to memory score is statistically significant on 48th day in group A ($P < 0.001$) and non-significant in group B ($P > 0.05$). But comparative result between the groups is statistically non-significant ($P > 0.05$).
4. Results with reference to school test performance is statistically significant on 48th day in group A only ($P < 0.001$) and non-significant in group B. As per observation made by the teachers, group A children showed highly significant response when compared with group B children.
5. 500mg of medicine is given in divided doses which was well tolerated by all the volunteers and the duration of 48 days administration of *Vacha* fine

powder has not resulted in any untoward effect, this duration which was designed according to maximum duration advocated by Acharya Sushruta quoting "*Chaturdhwadasha ratri*"^[8] and this study revealed that *Vacha* is safe and effective as memory booster in Children.

Probable mode of action of *Vacha* Rhizome

1. *Medha*, *Buddhi* and *Smruti* are attributed to *Satwa guna*^[9]. *Akash*, *Agni* and *Jala mahabhuta* have *Satwa guna* predominance^[10] and drugs which have these *Mahabhuta* predominance said to possess *Satwa guna* predominance and *Vacha* is *Akasha* and *Agni mahabhuta* predominant drug which in turn helps in improvement of memory.
2. *Satva guna* is said to be having *Pitta*^[11] combination, so among *Gurvadi gunas*, *Laghu*, *Ushna*, *Teekshna*, *Sara*, *Picchila*, *Manda*, *Sukshma*, *gunas* have *satwa guna* predominance. *Vacha* has *Ushna*, and *Tikshna gunas*^[12] which promotes *Satwa guna*, which in turn encounters *Rajo* and *Tamo gunas* which are responsible for *Smrutihras* / *Smruti vibhramsha*.
3. *Vacha* rhizome is *Ushna veerya dravya*. This *Ushnatva* of *Vacha* being *Samanya* to that of *Pitta guna* stimulates the same and specifically may have an influence on *Sadak pitta* which governs the *Buddhi* and *Medha*^[13]
4. Drugs which have *Sukshma*, *Vishada*, *Ruksha*, *Gunas* are *Srotoshodak*^[14] in nature and *Vacha* consisting *Suksma guna*^[15], keeps the channels/pathways of brain clear and promotes *Medha*.

CONCLUSION

Vacha rhizome *churna* show the better memory boosting activity in children in comparison with Dextrin. Statistically significant results were found in group A, observed between the results of 0th day and 96th day with $P < 0.01$ in subjective parameter for Memory Score in Test of Memory For Children, Statistically significant change was observed on 96th day between both groups with $P < 0.004$ in the subjective parameter for School Test Performance, and improvement in mean values of subjective concentration and recollection observed by the teachers in Group A, on 48th and 96th day 70% (14 children), 80% (16 children) respectively showed better response on 48th and 96th days and good response in 30% (06 children) and 20% (04 children) respectively on 48th and 96th day in Group A.

No untoward event has found during the study, no children have experienced any vomiting sensations or nausea or any type of gastric upset during the study period for whatever the dose and duration fixed for the study, which guides us to take up the *Vacha* drug as a

memory enhancer in the school going children replacing the modern supplements.

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