INTERNATIONAL
AYURVEDIC
MEDICAL JOURNAL

IAMJ

Research Article ISSN: 2320 5091 Impact Factor: 4.018

THE EFFECT OF SELECTED YOGA TECHNIQUES AND VACĀ CHŪRṆA ON SHORT TERM MEMORY OF HIGH SCHOOL STUDENTS

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ABSTRACT

Background: Effective and efficient memory is critical for school children for their success. The memory demand for school children is much greater than that of adult. The stress from the school and home environment are too high for high school students as they were promoted from upper primary to high school. Constant attention and concentration inside the classroom is required for the sensory inputs to enter the short term memory store. The delayed short-term memory in students is due to lack of their concentration and attention in the class and is mainly due to their mental stress. Studies on *Nādi Shudhi Pranayama* proved that it has a beneficial effect on the respiratory function and improves the ability to stay focused during difficult mental tasks. It stimulates *Ajna* and *Mooladhara chakras* and balances Ida and *Pingala Nadis*, thus enhancing spiritual progress[1]. Also *Surya Namaskara* is effective for mental quietness, for ease or peace of mind, makes a person rested and refreshed, bestows strength, awareness and joy, removes somatic stress, worries and negative emotions[2]. Several *Medhya Rasayanas* are described in our classics either in single form or in combination with other drugs. From the *vedic* times itself, references of administration of *Vacā chūrṇa* is available. *Vacā* is well known for inducing lucidity of mind. *Vacā* is considered as a brain tonic which promotes higher mental functions. **Aim:** The study aimed to evaluate the combined effect of administration of *vaca churna* and selected yoga techniques in short term memory of high school students. **Study Design:** it was a randomised clinical study. **Materials and Methods:** The short term memory was assessed by tests with pictures, words and mini mental state examination questionnaire. Students with less scoring in the tests were randomly assigned into two groups according to the inclusion criteria (N=40). Group A (N=20) were administered with 125mg of *Vacā chūrṇa* and *yoga* procedures. Group B (N=20) were given yoga techniques only. After one month the short term memory was again assessed by another set of same tests with another sample tests. **Results:** The results were statistically assessed. The group with both the procedures showed significant improvement as compared to other group. **Conclusion:** The present study proved that there is an add on effect in the administration of *vacā churna* along with the proved yoga techniques in improving the short term memory of high school students.

Keywords: short term memory, *Nādi Shudhi Pranayama, Surya Namaskara, Vacā chūrṇa*

INTRODUCTION

The memory demand for school children especially the high school students is much greater than that of adults. School children are constantly bombarded with new knowledge irrespective of their interest. So, efficient and effective memory is critical for their success. Firstly, the auditory, visual and other sensory memory inputs are stored in a short term store. Short term memory is the capacity for holding a small amount of information in mind in an active, readily available state for a short period of time[3].

In our classics, several *medhya rasāyanas* are described either in single form or in combinations. Traditionally

'*vacā'* or *Acorus calamus* is used along with honey for new born babies. By referring our classics about '*vacā'* it is told to be *medhya* or drug to improve memory. There are minimal studies done regarding the effect of '*vacā'* in memory boosting. Considering modern science there are many limitations regarding the dosage, duration and side effects of the internal medications for memory improvement. Even though several memory boosting exercises are there, it is not effective in reducing the stress among school children. So it is essential to implement an alternative and cost effective solution for the problem concerned. Yoga techniques which are proved to be effective in reducing the stress and it can be adopted as a healthy life style itself for the prevention of many diseases. Various studies on *surya namaskara* and *nādi shudhi pranayama* prove its effectiveness in reducing the stress and improving the attention and concentration especially in school going children. So it will be beneficial to find an effective single drug along with proven yoga techniques for reducing the stress and improving the short term memory of students.

AIM AND OBJECTIVES:

To evaluate the combined effect of administration of *vacā churṇa* and selected yoga techniques in short term memory of high school students.

MATERIALS AND METHODS

Null hypothesis: *Vaca churna* has no add on effect with yoga techniques in improving the short term memory of high school students.

Alternate hypothesis: *Vaca churna* has add on effect with yoga techniques in improving the short term memory of high school students.

Materials

Vaca churna, Honey, Short term memory test material, Mini Mental state examination questionnaire

Method of study: clinical study

Source of data: High school students from S.N.G.S. High school Ezhukone, Kollam

Study design:

Clinical study comprising of two groups

Group A – 20 students were given 125mg of *vacā churṇa* and yoga techniques.

Group B – 20 students were given yoga techniques only

Methodology

The methodology adopted is the randomised clinical study comprising of two groups. Group A with 20 students, advised to take 125mg of *vacā churṇa* with honey early in the morning and to do yoga techniques and *Pranayama*, and Group B with 20 students advised to do yoga techniques and pranayama. Yoga procedures include *Suryanamaskara* 12 rounds with intermittent relaxation with *Shavasana* and 12 rounds of *Nādisudhi Pranayama*. The whole procedure was done for one month. The source of data was from a government school. On the first visit, an awareness class was given regarding the study to students of 8th and 9th standard from S.N.G.S High School Kadakkode, Ezhukone, Kollam. On the next visit short term memory was assessed and 40 students with less scoring were selected for the study. Consent was obtained from the parents of the students. On the next visit, they were assigned into two groups by lottery method of randomisation and those fulfilling inclusion criteria. Yoga techniques and *Nādisudhi Pranayama* were taught to all 40 students. After one month the short term memory was again assessed by another set of same tests. The scores were compared by statistical tests. Assessment Criteria includes Tests for assessment of short term memory, Short-term memory test – Pictures, Serial effects test – Words and Mini Mental State examination.

Inclusion criteria

- High school students of both sexes between 12-15 years
- Students with less scoring in short term memory assessment tests

Exclusion criteria

- Age below 12 years and above 15 years
- Students with Mental retardation, Epilepsy and any other systemic disorder

Assessment criteria

- Short term memory test – pictures
- Short term memory test – words
- Mini Mental state examination questionnaire

RESULTS:-

In the study 42 students were selected for the study according to the assessment criteria and 40 students completed the study. The results were statistically analysed. Statistical Analysis was done using **SPSS VER. 20**

Mann-Whitney U test is done on parameters, to interpret the changes between the groups

SHORT TERM MEMORY PICTURES: From this data, we found that there is statistically no significant changes of SHORT TERM MEMORY PICTURES occurs in BT and AT of treatment and it can be concluded that the effect of treatment in SHORT TERM MEMORY PIC-

TURES by comparing the Mean ranks between the groups, the group with medicine and yoga having greater mean rank than Group with yoga only at AT of treatment. It can be concluded that Group with medicine and yoga having more effect than Group with yoga only with U=200, P-value=1.000 (>0.05)

Table 1:

Ranks					
	Group	N	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)
SHORT_TERM_MEMORY_PICTURES_BT	group with medicine and yoga	20	19.50	180.000	0.532
	group with yoga only	20	21.50		
	Total	40			
SHORT_TERM_MEMORY_PICTURES_AT	group with medicine and yoga	20	20.50	200.000	1.000
	group with yoga only	20	20.50		
	Total	40			
SHORT_TERM_MEMORY_WORDS_BT	group with medicine and yoga	20	16.88	127.500	0.025
	group with yoga only	20	24.13		
	Total	40			
SHORT_TERM_MEMORY_WORDS_AT	group with medicine and yoga	20	19.50	180.000	0.435
	group with yoga only	20	21.50		
	Total	40			
MINI_MENTAL_STATE_EXAMINATION_BT	group with medicine and yoga	20	17.05	131.000	0.046
	group with yoga only	20	23.95		
	Total	40			
MINI_MENTAL_STATE_EXAMINATION_AT	group with medicine and yoga	20	20.23	194.500	0.870
	group with yoga only	20	20.78		
	Total	40			

Wilcoxon signed rank test showed increase in Short Term Memory score Analysis between BT and AT was found significant in both the groups with P-Value=0.0001 which is <0.05. On considering the Positive rankings on each group, it is found that 18 students having improvement in the short term memory scores for words in Group A and only 16 students got memory improvement in Group B. So there was improvement in Group A than in Group B.

Table 2:

SHORT_TERM_MEMORY_PICTURES **Ranks**						
			N	Mean Rank	Z-Value	Asymp. Sig. (2-tailed)
GROUP A	SHORT_TERM_MEMORY_PICTURES_AT - SHORT_TERM_MEMORY_PICTURES_BT	Negative Ranks	0[a]	.00	-3.852	0.0001
		Positive Ranks	18[b]	9.50		
		Ties	2[c]			
		Total	20			
GROUP B	SHORT_TERM_MEMORY_PICTURES_AT - SHORT_TERM_MEMORY_PICTURES_BT	Negative Ranks	0[a]	.00	-3.624	0.0001
		Positive Ranks	16[b]	8.50		
		Ties	4[c]			
		Total	20			
SHORT_TERM_MEMORY_WORDS **Ranks**						
			N	Mean Rank	Z-Value	Asymp. Sig. (2-tailed)

GROUP A	SHORT_TERM_MEMORY_WORDS_AT - SHORT_TERM_MEMORY_WORDS_BT	Negative Ranks	0[d]	.00	-3.946	0.0001
		Positive Ranks	19[e]	10.00		
		Ties	1[f]			
		Total	20			
GROUP B	SHORT_TERM_MEMORY_WORDS_AT - SHORT_TERM_MEMORY_WORDS_BT	Negative Ranks	0[d]	.00	-3.947	0.0001
		Positive Ranks	18[e]	9.50		
		Ties	2[f]			
		Total	20			

MINI_MENTAL_STATE_EXAMINATION **Paired t-test**								
		Mean	MD	Std. Deviation	Std. Error Mean	t-value	df	p-value
GROUP A	Mini Mental State Examination_BT	3.80	-.750	.910	.204	-3.684	19	.002
	Mini Mental State Examination_AT	4.55						
GROUP B	Mini Mental State Examination_BT	4.45	-.200	1.105	.247	-.809	19	.428
	Mini Mental State Examination_AT	4.65						

DISCUSSION

Socio economic status: - All students who participated in this study are from BPL families. Studies on humans and animal models suggest that socio economic status have strong influence with the brain development, cognition, academic achievement and mental health[4]. Also the influence of parenting quality has an effect in determining the cognition and mental status of the students. Mostly the educational qualifications of the parents are also very low in low socio economic status families. It can have a direct effect on the mental functions of the student.

Sleep:- The sleep pattern of 37% of students are disturbed. The studies in animal and human models suggest that the quantity and quality of sleep have some impact on learning and memory, even though the exact mechanism of relation is not identified properly.

Satva:- Among the 40 students 35% of students were of *alpasatwa.* They were too much disturbed by emotions and stress. It is told in Ayurvedic science that the disturbance of *manovaha srotas* occurs mainly in *alpasatva* persons.

Academic Performance:- the students enrolled in the study were academically low performing as compared to other students in the class. After the study there was improvement in overall academic performance of the students. This shows that yoga has strong influence in improving the quality of an individual both mentally and spiritually.

Discussion on results

Short term memory assessment test pictures:- The test result comparison in between groups were not statistically significant. But when compairing the mean ranks of the groups, the group with medicine and yoga shows improvement in short term memory tests with pictures more than that of the group with yoga only. Also by clinical assessment there was marked improvement in scoring in the short term memory assessment tests in group A.

In overall assessment the group with medicine and yoga showed 56.25% improvement of short term memory. It shows that in this test yoga has more influence than medicine.

Surya Namaskara is not a mere sequence of Asanas. It combines body movement with breath and awareness. This practice can increase the parasympathetic activity of the autonomous nervous system. It reduces the anxiety and other stress related problems. There is increased blood flow to each system of the body during the practice of *Surya Namaskara.* Also, there may be sequential activation of each *chakra* and the individual is benefited physically mentally and spiritually.. *Nādi shudhi pranayama* is the best method of pranayama for beginners. In the starting stage of pranayama the ratio of puraka: kumbhaka: recaka is 1:1:2. By regular practice we can increase this ratio to 1:2:4 and so on. *Nādi shudhi pranayama* improves the normal functioning of both the *eda* and *pingala nadis.* When the *Ida nadi* is not functioning smoothly or is blocked, one experiences cold, depression, low mental energy etc., whereas when the *Pingala nadi* is not smoothly functioning or is blocked, one will experience

heat, quick temper and irritation. These all can be removed by practicing *nādi shudhi pranayama.*

Short term memory tests words: - In this test, the between group comparison showed significant results. The short term memory improvement of Group A is more as compared to the other group. In overall assessment also there was 51.02% improvement in group A and only 40% improvement in Group B. This shows that the *vacā churṇa* has action in improving the short term memory of students. It may act by *Prabhava* or *Rasa* or *Guna* or *Virya*. It is difficult to predict the exact mechanism and mode of action of drug. Certain drugs can act with their *rasa*, some other by its *Vipaka*, some other by its *vīrya* and some others acts by its *prabhava*. The *katu rasa* of *vāca* itself stimulates the *agni* and purifies the *srotas* and act as *medhya* and *rasāyana.* Its *laghu thiksṇa guṇa* stimulates the normal functioning of *prāna vāta*, *udana vāta* and *sadhaka pitta* and thereby improving the *budhi, smṛti* and *medha.* By its *srotoshodhana* action it can remove the *Avarana* of *Tamas* and thus improve *Grahana shakti* and *smarana shakti*.

Mini mental state examination: - In this tests, the between group comparison has no significant results. But comparing the means of BT and AT between groups, there was marked improvement in mental state examination scores. In overall performance also there was improvement upto 19.48% percentage in Group with both medicine and yoga and in Group with yoga only is 4.49%. This shows that both the yoga and medicine had strong influence in improving the mental state of the student. The mental state of the student is very much influenced by the various stresses in daily life at school and home environment. Yoga procedures and *pranayama* helps to bring about the balance of mind and may help to remove the mental stresses. According to Ayurveda the normal functioning of *tridosas* with the presence of *manas* help in the normal perception of *indriyas*, *medha*, *budhi* and *smriti*. By normalising the *tridosa* and improving the mental qualities of an individual, normal perception of all these can be brought about.

It can be concluded that the drug *vacā* had showed influence in improving one of the tests of short term memory. On the other hand the yoga procedures showed considerable influence in improving the overall performance of the students.

CONCLUSIONS

The present study proved that there is an addition on effect in the administration of *vacā churna* along with the proved yoga techniques in improving the short term memory of high school students. Further studies are to be done with large sample sizes and longer durations to assess its effect in overall performance of students.

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Source of Support: Nil
Conflict Of Interest: None Declared

How to cite this URL: Deepa S et al: The Effect Of Selected Yoga Techniques And Vacā ChūrṆa On Short Term Memory Of High School Students. International Ayurvedic Medical Journal {online} 2018 {cited January, 2019} Available from: http://www.iamj.in/posts/images/upload/50_54.pdf