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Effect of 12-weeks training of Suryanamaskar with mantras and breathing on short-term memory for digit span

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Abstract

The purpose of the study was to investigate the effect of 12-weeks training of suryanamaskar (SN) with two variations (SN with mantra chanting and following fixed breathing pattern) from the ordinary SN on short-term memory i.e., measured through Wechsler Intelligence Scale for Children - Memory for Digit Span in school children. For this purpose 36 male school children (12 in each group), of 13-15 years of age groups with a mean and SD of 13.72 ± 0.88 were selected from Ram Krishna Vidya Mandir, Gwalior, Madhya Pradesh as subjects. In order to investigate the existence of significant difference among different group's performance on memory for digit span the analysis of co- variance (ANCOVA) was used and level of significant was set at 0.05. The result showed that there was significance difference in memory for digit span between mantras and control group and mantras and breathing group. There was no significant difference found between breathing and control group.

Keywords: The digit span test, Suryanamaskar, SN Mantras, breathing pattern, short-term memory

1. Introduction

Sun salutation (Surya Namaskar) is an ancient Indian method of offering prayers to the rising Sun in the morning along with a series of physical postures with regulated breathing aiming at range of physical, mental and spiritual benefits. Facing east, in the early hours of morning, one standing with serene mind offers prayer to Lord Sun (Surya in sanskrit) with suryanamaskar. Along with physical postures, suryanamaskar has specific spiritual connotations attached to it. Suryanamaskar is a graceful combined sequence of twelve positions along with regulated breathing and relaxation (Saraswati SS, 2002) ^[3,4].

According to the scriptures, if performed correctly, Suryanamaskar does not strain or cause injury. If performed in the morning, it relieves stiffness, revitalizes the body, refreshes the mind and purifies subtle energy channels (Saraswati SS, 2002) ^[3,4]. Though the greatness of Suryanamaskar has been greatly said in scriptures not much research has been done to understand its benefits.

Measures of forward and backward digit span (DS) are among the oldest and most widely used neuropsychological tests of short-term verbal memory. For decades they have been a component of the widely used Wechsler memory scales (WMS) and Wechsler intelligence scales for adults and children. In each case, digit span is measured for forward and reverse-order (backward) recall of digit sequences. Digit sequences are presented beginning with a length of two digits and two trials are presented at each increasing list length. Testing ceases when the subject fails to accurately report either trial at one sequence length or when the maximal list length is reached (9 digits forward, 8 backward). The total number of lists reported correctly is combined across forward span (FS) and backward span (BS) to produce a Wechsler total correct score.

In this study, the influence of 12-weeks training of two variation of suryanamaskar (SN with mantra chanting and with fixed breathing pattern) on short-term memory i.e., measured through Wechsler Intelligence Scale for Children - Memory for Digit Span Test was investigated in school children. The test of short-term memory for digit span depends on verbal memory.

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It is easily understood and performed and suitable for subjects of all ages, including school students. It was therefore the test given to subjects participating in this study before and after the training. The main objective of this study was to investigate possible improvements in short-term memory for digit span after completing 12-weeks training of suryanamaskar with chanting the mantras and by following the fixed breathing pattern.

2. Materials and methods

2.1 Subjects

For the purpose of the study 36 male (12 in each group i.e. SN with mantra chanting group, SN with fixed breathing pattern and ordinary SN group) school children from Ram Krishna Vidya Mandir, Gwalior, M.P. were selected randomly as the subjects for this study. The age of the subjects was between 13-15 Years.

2.2 Variable

2.2.1 Memory for Digit Span test: There are two parts to the memory for digit span assessment; digits forward and digits backward. Each taps distinct but interdependent cognitive functions. Digits forward primarily taps short-term auditory memory while digits backward measures the child's ability to manipulate verbal information while in temporary storage. In digits forward, the child listens to and repeats a sequence of numbers spoken aloud by the interviewer. In digits backward, the child listens to a sequence of numbers and repeats them in

reverse order. In both parts, the length of each sequence of numbers increases as the child responds correctly.

2.3 Statistical Technique

The statistical technique applied in order to examine the existence of significant difference among different group's memory for digit span were, descriptive statistics such as mean and standard deviation and comparative statistics of analysis of co- variance (ANCOVA) at level of significance 0.05. SPSS 20 was also used.

The assumptions for applying analysis of co- variance (ANCOVA) were also taken into consideration.

2.4 Training Protocol

The total training duration for each day was forty-five to fifty minutes (5 days a week) for 12 weeks. The training was progressive in nature. It includes 2 minutes for stretching, 1 minute for starting prayer and 5 minutes for relaxation and closing prayer. Duration for per posture (12 postures in suryanamaskar) was fixed to 10 seconds. Total time duration for one round of suryanamaskar was fixed to 2 minutes and total rounds were sixteen. Group I perform the suryanamaskar without chanting the SN mantras and breathing pattern and act as the active control group. Group II perform the suryanamaskar with chanting the SN mantras along with respective asanas. Group III perform the suryanamaskar with fixed breathing pattern.

Table 1: Details of asana and respective mantras in suryanamaskar

	Asana	Related Mantra	Breathing Pattern
Position 1	Pranamasana	Om Mitraya Namaha	Breathe normally
Position 2	Hasta Utthanasana	Om Ravaye Namaha	Inhale
Position 3	Padahastanasana	Om Suryaya Namaha	Exhale
Position 4	Ashwa Sanchalanasana	Om Bhanave Namaha	Inhale
Position 5	Parvatasana	Om Khagaye Namaha	Exhale
Position 6	Ashtanga Namaskara	Om Pushne Namaha	No respiration
Position 7	Bhujangasana	Om Hiranya Garbhaya Namaha	Inhale
Position 8	Parvatasana	Om Marichaye Namaha	Exhale
Position 9	Ashwa Sanchalanasana	Om Adityaya Namaha	Inhale
Position 10	Padahastanasana	Om Savitre Namaha	Exhale
Position 11	Hasta Utthanasana	Om Arkoya Namaha	Inhale
Position 12	Pranamasana	Om Bhaskoraya Namaha	Exhale

3. Results and Findings

Table 2: Descriptive statistics for pre and post-performance in digit span for different groups

Treatment Group	Mean (pre)	Mean (post)	SD (pre)	SD (post)	N
Control Group	10.83	12.50	3.19	3.78	12
Mantras Group	10.83	18.00	3.59	2.66	12
Breathing Group	11.25	14.08	2.90	3.92	12
Total		14.86		4.13	36

Table 2 shows the scores of mean and S.D. of control, mantras and breathing group on pre and post-performance in digit span test. The mean & S.D of control, mantras and breathing group for pre-performance in digit span are 10.83±3.19; 10.83±3.59 and 11.25±2.90 respectively. The

mean & S.D of control, mantras and breathing group for post-performance in digit span are 12.50±3.78; 18.00±2.66 and 14.08±3.92 respectively. The mean for post-performance in digit span of the mantras group is larger than that of the breathing group and control group.

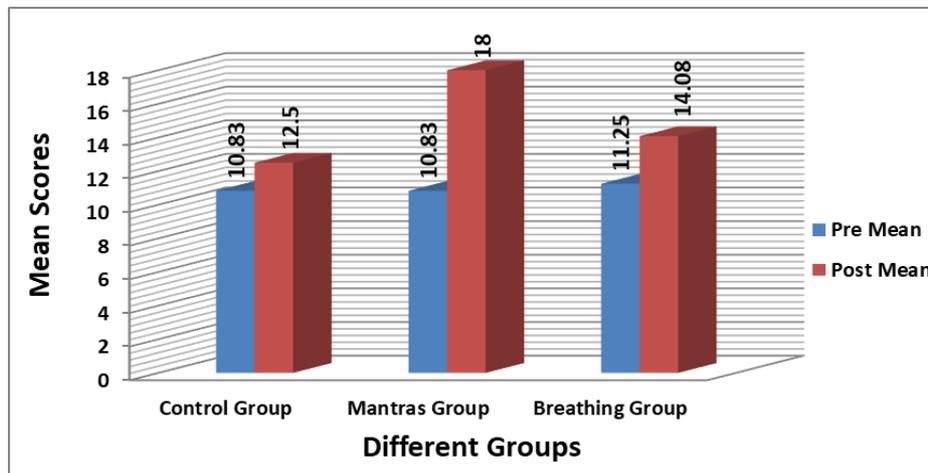


Fig 1: Graphical representation of mean on performance for digit span on pre and post-test among various groups

Table 4: Adjusted mean and standard error of both groups in post-testing

Suryanamaskar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control Group	12.60 ^a	0.74	11.097	14.111
Mantras Group	18.10 ^a	0.74	16.597	19.611
Breathing Group	13.88 ^a	0.74	12.366	15.384

a. Covariates appearing in the model are evaluated at the following values: Pre Performance in Digit Span = 10.9722.

Table 4 shows the adjusted mean and standard error of control, mantras and breathing group on post-performance for digit span after elimination of effect of covariate in comparing the effectiveness of treatment groups during post-testing. The

adjusted mean & standard error of control, mantras and breathing group for post-performance in digit span are 12.60±0.74; 18.10±0.74 and 13.88±0.74 respectively.

Table 5: ANCOVA table for the post-performance in digit span

Source	Type I Sum of Squares	df	Mean Square	F	Sig. (p-value)
Pre Digit Span	193.735	1	193.735	29.496	0.000
Treatment Group	198.921	2	99.460	15.143	0.000
Error	210.182	32	6.568		
Corrected Total	596.306	35			

a. R Squared = .648 (Adjusted R Squared = .614)

Table 5 shows that the p-value for the F- statistic is 0.000 which is less than 0.05, so it is significant. Thus, the null hypothesis of no difference among the adjusted post-means

for the data on Memory for Digit Span in three treatment groups may be rejected at 5% level.

Table 6: Pair-wise comparisons on memory for digit span of different group means

(I) Treatment Group	(J) Treatment Group	Mean Difference (I-J)	Sig. (p-value)
Mantras Group	Control Group	5.500*	0.000
	Breathing Group	4.229*	0.001
Breathing Group	Control Group	1.271	0.702

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

* The mean difference is significant at the 0.05 level.

Since F- statistic is significant, post hoc comparison has been made for the adjusted means of both the groups. It may be noted that the p-value for the mean difference between mantras and control group is 0.000; mantras and breathing group is 0.001 and breathing and control group is 0.702. These p-values which are less than 0.05 are significant and which are greater than 0.05 are insignificant at 5% level. Thus, the following conclusions can be drawn:

- i. There is a significant difference between the adjusted means of the mantras and control group on the data of memory for digit span during post-testing.
- ii. There is a significant difference between the adjusted means of the mantras and breathing group on the data of

memory for digit span during post-testing.

- iii. There is no significant difference between the adjusted means of the breathing and control group on the data of memory for digit span during post-testing.

Table 7: Post hoc comparison of adjusted means of the data on digit span obtained in post-measurement shown with graphics

Mantras Group	Control Group	Breathing Group
18.10	12.60	13.88

Represents no significant difference the means

Table 7 shows the adjusted post-means of different groups written in the descending order. A line drawn under the two

groups shows the mean difference is not significant. So, it can be seen from the above table there is no significant difference between control and breathing group.

4. Discussion

On the basis of the results of the study, the hypothesis stated that there would be significant difference in memory for digit span among different groups on school students was found to be true. In memory for digit span, hence it can be concluded that practice of SN with mantra chanting for 12-weeks at school level can improve the level of short-term memory for digit span as compared to ordinary SN and SN with fixed breathing pattern group. This improvement of memory for digit span may be because of practice of suryanamaskar with mantra chanting. Sripad (2006) [5] studied the effect of Vedic chanting on memory and sustained attention and found the similar results i.e. significant increased scorings in memory tests and considerable reduction in total error and total time taken for cancellation tests compared to non-chanting practitioners. Another study also suggests i.e. maha mantra has potential in addressing problems related to stress and depression. Vedic and yogic mantra chanting shows the improvement in the well-being and memory in some specific studies (Lolla, 2017; Sripad *et al.*, 2006) [2, 5].

In the case of control and breathing group, it can be clearly revealed from the descriptive table (table 2) the memory for digit span in both the groups was also improved but statistically it was not significant at 5% level of significance. The results found in this study may reveal that the mantras chanting during the practice of suryanamaskar have the greater impact on memory for digit span.

5. Conclusion

There is a significant difference found between the adjusted means of the SN with mantra chanting and ordinary SN group and SN with mantra chanting and SN with fixed breathing pattern group on memory for digit span during post-testing. There is no significant difference found between the adjusted means of the SN with fixed breathing pattern and ordinary SN group on memory for digit span during post-testing.

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