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Effect of 6 –weeks training of mantras and breathing in Surya Namaskar on performance of digit-letter substitution task by school children

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Abstract

Memory and selective attention are important skills for academic and professional performance. Techniques to improve these skills are not taught either in education or company training courses. So, any system which can systematically improve these skills will be of value in schools, universities, and workplaces. The purpose of the study was to investigate the effect of 6-weeks training of Surya Namaskar (SN) with two variations (Mantra chanting and following fixed breathing pattern) from the ordinary SN on performance of digit-letter substitution test (DLST) in school children. For the purpose of this study 36 male (12 in each group), of 13-15 years of age groups with a mean and SD of 13.72 ± 0.88 were selected from school children from Ram Krishna Vidya Mandir, Gwalior, Madhya Pradesh as the subjects for this study. In order to investigate the existence of significant difference among different group's performance on DLST the analysis of co- variance (ANCOVA) was used and level of significant was set at 0.05. The result showed that there was significant difference in performance on DLST between mantras and control group. There was no significant difference between mantras and breathing group and breathing and control group.

Keywords: Digit-Letter Substitution Test (DLST), Surya Namaskar, SN Mantras, Breathing Pattern, Attention

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.

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) ^[1, 2]. Though the greatness of Suryanamaskar has been greatly said in scriptures not much research has been done to understand its benefits.

Selective attention is important skills for academic and professional performance. Techniques to improve these skills are not taught either in education or company training courses. Any system which can systematically improve these skills will be of value in schools, universities, and workplaces. Substitution tests is widely used as clinical and research tools in neuropsychology (Lezak, 1995) ^[9], the best known of which is the Digit-letter substitution test, one of the subtests from the Wechsler Intelligence Scales. Several adaptations of the test now exist (e.g., Smith, 1982) ^[10]. Substitution tests are essentially speed dependent tasks that require the participant to match particular signs—symbols, digits, or letters—to other signs within a specified time period. Substitution tests are sensitive to brain dysfunction (Lezak, 1995; Spreen & Strauss, 1998) ^[9, 11] in a nonspecific way because their performance draws on many different processes: the simple responses generated in substitution

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tests depend on the integration of complex neuropsychological processes, including visual scanning, mental flexibility, sustained attention, psychomotor speed, and speed of information processing (Lezak, 1995) [9]. This nonspecific sensitivity to brain dysfunction, combined with the possibility of group administration and the short test time, makes substitution tests and letter cancellation tests are highly suitable as screening instruments.

In this study, the influence of six week training of two variation of suryanamaskar (SN with mantra chanting and with fixed breathing pattern) on performance of the Digit–letter substitution test (DLST) was investigated. The DLST depends on selective attention and memory. 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 memory and selective attention, as measured by the Digit–letter substitution test (DLST) after completing six week training of suryanamaskar with chanting the mantras and by following the fixed breathing pattern.

Statement of the problem

The purpose of the study was to evaluate the effect of 6–weeks training of two variation of Suryanamaskar on performance of digit-letter substitution test by school children.

Methodology

Subjects

For the purpose of the study thirty-six male (twelve in each group i.e. SN with mantra chanting group, SN with fixed breathing pattern and twelve in general 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.

Variable

Digit-letter substitution test (DLST): This task involves

visual scanning, mental flexibility, sustained attention and psychomotor speed of information processing. Digit substitution test has already been standardized for use in Indian population (Natu, 2004) [4].

Subjects were made to sit on the desk (two in a desk with a distance of two meters between them). They were given necessary instructions about the task. The DLST consisted of a worksheet which had 12 rows and 8 columns and randomly digits arranged in rows and columns. The participants were asked to substitute as many target digits as possible in the specified time of 90 seconds. They were instructed to substitute letter by their own choice either in a horizontal, vertical or randomized manner by selecting the particular digit. The total number of substitutions and wrong substitutions are scored. The net score was obtained by deducting wrong substitutions from the total substitutions attempted (Natu, 2004) [4].

Data extraction

The total number of substitutions and wrong substitutions were scored. The net score was obtained by deducting wrong substitutions from the total substitutions attempted. The scoring was done by the experimenter who was unaware of the names of the subjects to whom the data sheets belonged. This ensured masking of the data while doing the data extraction.

Statistical Technique

The statistical technique applied in order to examine the existence of significant difference among different group’s performance on DLST 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.

Training Schedule

Table 1: Training programme for school children

	Group 1 (Control)	Group 2 (Mantras)	Group 3 (Breathing)
Training Variation	SN	SN with mantras	SN with breathing
Training Duration	45-50 minutes	45-50 minutes	45-50 minutes
SN Rounds	16	16	16
Rounds*-Rest**	4-2-4-2-4-2-4	4-2-4-2-4-2-4	4-2-4-2-4-2-4
Starting Prayer	1 minutes	1 minutes	1 minutes
General Stretching	2 minutes	2 minutes	2 minutes
Relaxation Posture & Closing Prayer	5 minutes	5 minutes	5 minutes
Duration for per Asana	10 sec	10 sec	10 sec
Mantra chant + Transformation + Hold	---	3 Sec + 4 Sec + 3 Sec	
Transformation + Hold	7 Sec + 3 Sec	---	7 Sec + 3 Sec

*Round in numbers **Rest in minutes

- Five days in a week training session in morning hours 6am to 7am.
- Every day session for 45-50 minutes.
- Two different training i.e. suryanamaskar with mantra chanting and suryanamaskar with fix breathing pattern.
- Total duration for training programme was 6 weeks.

Table 2: 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 while raising the arms
Position 3	Padahasthasana	Om Suryaya Namaha	Exhale while bending forward
Position 4	Ashwa Sanchalanasana	Om Bhanave Namaha	Inhale while stretching the right leg back
Position 5	Parvatasana	Om Khagaye Namaha	Exhale while taking the left leg back

Position 6	Ashtanga Namaskara	Om Pushne Namaha	The breath is held out in this pose. There is no respiration.
Position 7	Bhujangasana	Om Hiranya Garbhaya Namaha	Inhale while raising the torso and arching the back
Position 8	Parvatasana	Om Marichaye Namaha	Exhale while raising the buttocks
Position 9	Ashwa Sanchalanasana	Om Adityaya Namaha	Inhale while assuming the pose
Position 10	Padahastasana	Om Savitre Namaha	Exhale while performing the movement
Position 11	Hasta Utthanasana	Om Arkoya Namaha	Inhale while straightening the body
Position 12	Pranamasana	Om Bhaskoraya Namaha	Exhale while assuming the final position

Results and Findings

Table 3: Descriptive statistics for post-performance in DLST in different groups on school children

Treatment Group	Mean (pre)	Mean (post)	Std. deviation (pre)	Std. Deviation (post)	N
Control Group	48.67	49.83	21.24	21.03	12
Mantras Group	40.17	45.00	18.48	17.79	12
Breathing Group	57.33	60.25	6.87	7.86	12
Total		51.69		17.31	36

Table 3 shows the scores of mean and S.D. of control group, mantras group and breathing group on post-performance in DLST. The mean & S.D of control group, mantras group and breathing group for post-performance in DLST are

49.83±21.03; 45.00±17.79 and 60.25±7.86 respectively. The mean for post-performance in DLST of the breathing group is larger than that of the mantras group and control group.

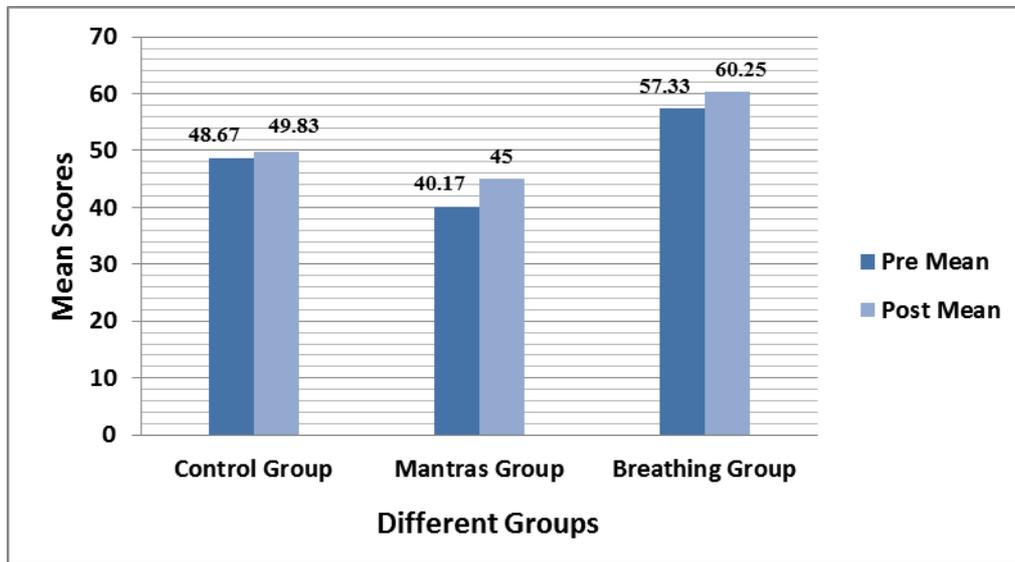


Fig 1: Graphical representation of Mean on performance in DLST on pre and post-test among various groups

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	49.89 ^a	0.85	48.149	51.625
Mantras Group	53.33 ^a	0.89	51.507	55.144
Breathing Group	51.87 ^a	0.89	50.051	53.690

a. Covariates appearing in the model are evaluated at the following values: Pre Performance in DLST = 48.7222.

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

post-testing. The adjusted mean & standard error of control group, mantras group and breathing group for post-performance in DLST are 49.89±0.85; 53.33±0.89 and 51.87±0.89 respectively.

Table 5: Ancova Table for the Post-Performance in Dlst

Source	Type I Sum of Squares	df	Mean Square	F	Sig. (p-value)
Pre_DLST	10136.599	1	10136.599	1160.304	0.000
Treatment_Group	69.483	2	34.741	3.977	0.029
Error	279.557	32	8.736		
Corrected Total	10485.639	35			

a. R Squared =.973 (Adjusted R Squared =.971)

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 performance in DLST in three treatment

groups may be rejected at 5% level.

Table 6: Pair-wise comparisons on performance in DLST of different group means

(I) Treatment Group	(J) Treatment Group	Mean Diff. (I-J)	Sig. (p-value)
Mantras Group	Control Group	3.438*	.009
	Breathing Group	1.455	.278
Breathing Group	Control Group	1.983	.118

Based on estimated marginal means

b. 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 group and control group is 0.009; mantras and breathing group is 0.278 and breathing and control group is 0.118. 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 performance in DLST during post-testing.

ii. There is no significant difference between the adjusted means of the mantras and breathing group on the data of performance in DLST during post-testing.

iii. There is no significant difference between the adjusted means of the breathing and control group on the data of performance in DLST during post-testing.

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

Mantras Group	Breathing Group	Control Group
53.325	51.871	49.887

“ ” 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 mantras and breathing group and breathing and control group.

Conclusion

There is a significant difference between the adjusted means of the mantras and control group on the data of performance in DLST during post-testing. There is no significant difference between the adjusted means of the mantras and breathing group and breathing and control group on the data of performance in DLST during post-testing.

Discussion

On the basis of the results of the study, the hypothesis stated that there would be significant difference in performance on DLST different groups in school students was found to be true. In performance on DLST, hence it can be concluded that subjects of mantras group at school level has improves the level of visual scanning, mental flexibility, sustained attention and psychomotor speed of information processing which can be measured through Digit-letter substitution test (DLST), after the practice of suryanamaskar with mantra chanting for 6 weeks.

This improvement of performance on DLST in mantras group may be because of practice of suryanamaskar with mantra chanting they have. Gayatri mantra and poem chanting led to improvement in performance, as assessed by DLST. Gayatri mantra influences significantly higher than poem chanting led in net score of female group. Another study also suggests i.e. maha mantra has potential in addressing problems related to stress and depression.

In the case of control and breathing group, it can be clearly reveals from the descriptive table (table 3) the performance on

DLST 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 performance in DLST.

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