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## Comparison of effect of Gayatri Mantra and Poem Chanting on Digit Letter Substitution Task

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### Abstract

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### Context:

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Attention is one of the components to enhance academic excellence. Traditional techniques were included in Indian schools to develop mental faculties with a view to add value to the latter.

### Aim:

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The aim was to evaluate the effects of Gayatri mantra (GM) chanting on attention as measured by digit-letter substitution task (DLST).

### Settings and Design:

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School setting and self as control study design.

### Materials and Methods:

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Subjects consisted of 60 school students included (boys = 30 and girls = 30) in the age range of 12-14 years, who were trained for chanting GM for 5 days. They were assessed on DLST immediately before and after two sessions (i) GM chanting (10 min) and (ii) Poem line (PL) chanting with an equal duration (10 min). Fifty percent of participants performed GM chanting and remaining on the PL recitation on day 6. The orders of the sessions were reversed on day 7.

### Statistical Analysis Used:

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Repeated measure analysis of variance with Bonferroni adjustment used.

### Results:

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Both sessions showed significant improvement in the total and net score of DLST. The magnitude of net score improvement was greater after GM (21.67%) compared to PL (4.85%). Female group had found better performance following GM compared to PL chanting.

### Conclusions:

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Both GM and PL led to improvement in performance, as assessed by DLST. But the influence of GM had significantly higher than PL in net score of female group.

**KEY WORDS:** Attention, Gayatri mantra, mantra, recitation

## INTRODUCTION

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Śabda Kalpadrumam defines mantra as “mantaboha mananēyacya (mNtbaeh mnnlyCy),” meaning repetition of a syllable.[1] Mantras originated in the Vedic tradition of India and an essential part of the Ancient Indian traditional life. The Gayatri mantra (GM) has been mentioned in the Rig Veda. The GM was revealed to the sage Vishwamitra. It is also called Savitr̥ mantra since it concerns the deity Savitr̥ (Sun).[2] According to the Indian tradition, GM initiated to a student before starting his/her formal education. It is said that chanting GM will bring the improvement in the *dhī śakti* (the power of intellect).[3]

Scientific investigation also found that yoga mantra (sutras of scriptures) and religious chanting (prayers) had positive influence on many physiological and psychological functions of the body. For example, during both prayers and mantras, there was an increase in the synchronicity of cardiovascular rhythms when they were recited 6 times a minute. There was also an increase in baroflex sensitivity. These findings suggested that the recitation of the rosary and certain yoga mantras, at specific frequencies, induce favorable psychological and physiological effects.[4] The significance of recitation of “Om” in twelve experienced meditators found subtle changes in mental state indicated by reduction in the skin resistance.[5] The different types of meditation in Japanese Buddhism showed different brain regional activation. The recitation of Buddha name (Nenbutsu) activated the prefrontal cortex, and the Buddhist sutra activated the left dorsolateral prefrontal cortex and right parietal cortex.[6]

In a match paired control study using chanting Vedic hymns showed improvement in sustained attention in teenaged school students of residential setup of similar ambience.[7] Hence, the present study has been designed to evaluate the effect of chanting GM on attention in school students.

## MATERIALS AND METHODS

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### Participants

Sixty healthy school students (30 boys and 30 girls) in the age group of 12-14 years (mean age:  $13 \pm 0.83$  years) were recruited for the study from an English medium school in Nasik, Maharashtra. Approval of the school authorities and consent of the parents were obtained before conducting the study.

### Design of the study

All the students were trained in GM and PL chanting for 5 days before the starting of the study and were assessed using digit-letter substitution task (DLST) (explained in the next paragraph) before and immediately after GM and PL chanting. The students were divided randomly into two groups and each group participated in both the GM and PL chanting. All the students were assessed for both (1) GM chanting and (2) PL chanting. Four recordings were made on consecutive days for each participant. This was a crossover study design.

### Assessment

DLST consisted of a worksheet, which has 8 rows and 12 columns and randomly arranged digits in rows and columns. The students are asked to substitute as many target digits as possible in the specified time of 90 s. The letter substitution may be undertaken in a horizontal, vertical, or a randomized manner by selecting a 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.[8]

### Structure of sessions

In order to avoid any possible learning effect, the participants were divided into two sessions randomly. They were asked to sit comfortably on the floor cross legged with eyes closed. Fifty percent of participants were asked to chant GM loudly for 10 min and remaining participants did PL chanting on day 6. The order of the sessions was reversed on day 7.

### Intervention

**Gayatri mantra** The students were asked to chant GM about 10 min. During chanting, the eyes were closed. The subjects followed the traditional procedure of chanting it loudly for its best effect to invoke the innate power of effulgence and intellect.

*Om bhūrbhuvah svaḥ tatsaviturvareṇyam bhargodevasya dhīmahi Dhiyoh yonāḥ pracodayāt ||*

### Poem line chanting

In control session, the same subjects were seated in a relaxed posture with open eyes. The duration of both the sessions was equal.

*ikkde tikkde cohi kade anandi ananda gade.*

### Data extraction

The total number of substitutions attempted and the number of wrong substitutions were counted. Then net score was obtained by deducting the latter from the former.[8] The answer sheets were coded and scoring was done by the researcher who was not involved in the study. It was cross checked by another researcher. Then entries were made in computer and checked.

### Data analysis

The raw data obtained for each subject in each recording session were tabulated separately. The statistical analysis was done using SPSS.

The group mean and standard deviation were calculated. Repeated measures analysis of variance (RMANOVA) were performed with two “Within subjects” factors, that is, Factor 1: Sessions: GM chanting and PL chanting and Factor 2: States; “Pre” and “Post.” The RMANOVA was carried out for each variable separately. Subsequently, *post hoc* tests with Bonferroni adjustment were performed to compare the data of the “Post” periods with those of the respective “Pre” period and also the different states were compared between sessions.

## RESULTS

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There were significant differences in between sessions (GM vs. PL) in (i) Total score  $F(1, 59) = 4.697, P = 0.034$  (ii) Wrong score  $F(1, 59) = 0.26, P = 0.873$  (iii) Net score  $F(1, 59) = 7.28, P < 0.001$ . There were significant differences in between states (pre vs. post) in (i) Total score  $F(1, 59) = 63.9, P < 0.001$ ; (ii) Wrong score  $F(1, 59) = 6.54, P = 0.013$  (iii) Net score  $F(1, 59) = 83.26, P < 0.001$ . There was significant interaction between sessions and states in (i) Total score  $F(1, 59) = 23.51, P < 0.001$ ; (ii) Wrong score  $F(1, 59) = 4.47, P = 0.034$  (iii) Net score  $F(1, 59) = 27.85, P < 0.001$ . *Post hoc* test with Bonferroni adjustment showed a significantly increase in (i) Total score ( $P < 0.001$ ) and (iii) net score ( $P = 0.001$ ) immediately after both GM and PL compared with their respective prescores. There was a significant increased in wrong score ( $P = 0.001$ ) in GM alone. The group average values  $\pm$  standard deviation are given in [Table 1](#).

### Gender subgroup analysis

Male group showed significant increases in total PL ( $P < 0.01$ ); GM ( $P < 0.001$ ), wrong PL ( $P < 0.05$ ); GM ( $P < 0.001$ ), and net PL ( $P < 0.01$ ); GM ( $P < 0.001$ ) score in both the sessions, that is, PL and GM.

Female groups had significant improvement in the GM sessions alone in total ( $P < 0.001$ ), wrong ( $P < 0.05$ ), and net ( $P < 0.001$ ) score. Also, GM sessions had significantly performed better in comparison to the PL session in total and net scores. This indicates that GM had positive impact on female.

## DISCUSSION

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There was a significant improvement in net score in both GM and PL sessions. But further analysis showed that GM significantly performed better than PL session in female. Previous two groups randomized wait-listed control study showed improvements in DLST when GM recited using two different methods, that is,

Ekaswar and Dwiswara which was aligned with our present study.[9]

The attention processes involve network of brain regions such as the prefrontal and temporal (including the parahippocampal gyrus) cortices, in addition to the anterior cingulate gyrus.[10] During a selective attention task, decreased activation was found in several areas of the dorsolateral prefrontal cortex, anterior cingulate in addition to parietal areas.[11] A feeling of resonating effect during audible “OM” chanting found significant deactivation was seen bilaterally during “OM” chanting in comparison to the resting brain state in bilateral orbitofrontal, anterior cingulate, parahippocampal gyri, thalami, and hippocampi. The right amygdala too demonstrated significant deactivation. No significant activation was observed during “OM” chanting. In contrast, neither activation nor deactivation occurred in these brain regions during the comparative task – Namely the “ssss” pronunciation condition.[12] The prayer of the Namu Amida Butsu (Nembutsu) activates the medial frontal gyrus, which is mainly related to mental concentration and visuospatial attention, similar to the areas activated by meditation. The task of reciting the sutra (Buddhist scriptures) activates the left lateral middle frontal gyrus, the right angular gyrus, and the right supramarginal gyrus, which are related to visuospatial attention also involved in the area activated by meditation.[6] All these studies indicate that recitation of GM may play a role in improving the attention potential.

The present study, although preliminary in nature, shows that recitation of GM improves attention. The limitations of the study, however, are: (1) Only the immediate effects of mantra chanting were studied and (2) the participants belonged to a single religious group. The strengths of the study as per our knowledge goes, this is the first study on self as control trial on immediate effect of GM on task performance among school children using simple paper pencil test, that is, DLST. Mantra recitation may be implemented in school setting which can help to raise the academic ability of the students along with their all round development. Future study may include different age groups of students for a longer duration (more than 1 week), different levels of attention, assessment methods to check physiological changes. This can be repeated irrespective of religions.

## ACKNOWLEDGMENT

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We thank for the support given by the school authority for conducting the study.

## Footnotes

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**Source of Support:** Nil.

**Conflict of Interest:** None declared.

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## Figures and Tables

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**Table 1**

Total, wrong, and net score for DLST pre- and post-GM chanting and PL chanting sessions; values are group mean±SD

Group	Score	PL Chanting		GM Chanting	
		Pre	Post	Pre	Post
Whole (n=60)	Total	47.62±12.62	50.88±12.71***	46.67±13.03	56.25±12.37***
	Wrong	1.20±0.29	1.43±0.17	0.80±0.27	1.77±0.12***
	Net	46.07±13.43	49.43±12.73**	45.70±12.70	54.83±12.39***
Male (n=30)	Total	44.7±11.61	50.3±14.33**	49.5±12.03	58.6±15.78***
	Wrong	1.27±1.36	2.4±2.65*	1.1±1.69	3.3±3.01***
	Net	42.73±10.62	47.87±12.5***	48.07±11.56	56±14.04***
Female (n=30)	Total	50.53±11.4	51.47±9.57	43.83±11.77	53.9±10.74***
	Wrong	1.13±1.55	0.47±0.82	0.5±0.86	0.23±0.73*
	Net	49.4±10.7	51±9.51	43.33±11.62	53.67±10.57***

\*\*\*P<0.001. Post hoc tests with Bonferroni adjustment. Postscores compared with respective prescores. DLST: Digit-letter substitution task. GM: Gayatri mantra. PL: Poem line. SD: Standard deviation

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## Commentary

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The editorial board appreciates the importance of studying validity of traditional beliefs. Once such belief is the positive effect of *Gāyatrī mantra* on concentration, hence it has decided to publish this paper, “titled Comparison of effect of Gayatri Mantra and Poem Chanting on Digit Letter Substitution Task”. We have observed certain methodological inadequacies in the paper. We consider it to be important to alert researchers on such important aspects in framing a study such as this. Here, in this study the selection of the Poem “ikkde tikkde cohi kade anandi ananda gade” could raise the following ambiguities (1) Whether there was any reason to select this specific poem for comparison 2) whether the authors have done any test to check whether the students understood the meaning of the poem. 3) As the meaning of *Gāyatrī mantra* and the poem are different, it is likely that it may have influenced the results.

The following may be the possibilities: The children were swayed by (1) the name ‘Mantra’, as it has esoteric connotations and hence the results skew in favour of *Gāyatrī mantra*. (2) the fact that the poem does not have the same meaning as *Gāyatrī mantra* could have skewed the current results in spite of this being a crossover study.

It is also possible that the students did not understand the meaning of *Gāyatrī mantra* at all, in this case, one group would have chanted something they thought was esoteric (*Gāyatrī*) but something they did not understand and another group were chanting something simple but something that they understood (poem in their regional language). In this case too, results could skew in favour of *Gāyatrī mantra*.

In case the children understood the meaning of *Gāyatrī Mantra* it means that one group were chanting something esoteric which they understood to be having a great meaning and the other group were chanting something simple i.e. not having great meaning. This could also make results skew in favour of *Gāyatrī mantra*.

Considering the above possibilities, it can be concluded that the design of the experiment has created results that are ambiguous.

-Editorial Board

