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Certificate

This is to Certify that the Doctoral Committee confirms that this is an authentic approved copy of the thesis titled **"CHANDOYOGA : Its Effects on Mindfulness, Anxiety, Emotions, Self-concept & Neuropsychological Variables in Adolescence" submitted by Mollika Ganguly bearing Registration No. PhD/Cat3/19/Jan14.**

The Viva-voce examination was conducted on Saturday, 17th September 2022 through online google meet with session link: meet.google.com/sez-haia-tni

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I hereby declare that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bengaluru, under the guidance of Dr. Sanjib Patra and Dr. Sampadananda Mishra, at S-VYASA University, Bengaluru. I also declare that the subject matter of my thesis entitled "***Chandoyoga*: Its Effects On Mindfulness, Anxiety, Self-Concept, Positive And Negative Affect & Neuropsychological Variables In Adolescence**" has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

Mollika Ganguly

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Place: Bangalore

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CERTIFICATE

This is to certify that Mrs. Mollika Ganguly who has been given Ph.D. Registration No.: PhD/Cat3/19/Jan14 with effect from January, 2014 by Swami Vivekananda Yoga Anusandhana Samsthana, Deemed to be University under the Division of Yoga and Humanity has successfully completed the required training in acquiring the relevant background knowledge and has completed the required course of research for not less than three years to submit this thesis entitled "*CHANDOYOGA*: ITS EFFECTS ON MINDFULNESS, ANXIETY, SELF-CONCEPT, POSITIVE AND NEGATIVE AFFECT & NEUROPSYCHOLOGICAL VARIABLES IN ADOLESCENCE", as per the regulations of the University. We also declare that the subject matter of this thesis entitled "*CHANDOYOGA*: ITS EFFECTS ON MINDFULNESS, ANXIETY, SELF-CONCEPT, POSITIVE AND NEGATIVE AFFECT & NEUROPSYCHOLOGICAL VARIABLES IN ADOLESCENCE" has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

Date: 23.10.2022

Place: Bengaluru

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Mollika Ganguly
(Candidate)

STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO TRANSLITERATE SANSKRIT WORDS

a	=	अ	**ṅac**	=	ङ	**pa**	=	प
ā	=	आ	**a**	=	च	**pha**	=	फ
i	=	इ	**cha**	=	छ	**bab**	=	ब
ī	=	ई	**ja**	=	ज	**ha**	=	भ
u	=	उ	**jha**	=	झ	**ma**	=	म
ū	=	ऊ	**ñ**	=	ञ	**yar**	=	य
ṛ	=	ऋ	**ṭaṭ**	=	ट	**a**	=	र
ṝ	=	ॠ	**ha**	=	ठ	**la**	=	ल
E	=	ए	**ḍa**	=	ड	**va**	=	व
ai	=	ऐ	**ḍha**	=	ढ	**śa**	=	श
O	=	ओ	**ṇa**	=	ण	**ṣa**	=	ष
au	=	औ	**ta**	=	त	**sa**	=	स
Ṁ	=	अं	**tha**	=	थ	**ha**	=	ह
Ḥ	=	अः	**da**	=	द	**kṣa**	=	क्ष
ka	=	क	**dha**	=	ध	**tra**	=	त्र
kha	=	ख	**na**	=	न	**jña**	=	ज्ञ
ga	=	ग						
gha	=	घ						

ABSTRACT:

Background

Adolescence is a critical age where due to immense physical and psychological transformations, children are found to have higher anxiety levels, identity crises leading to self-doubt, deregulated emotions etc. Failing to cope with these rapid changes there has been noticed decline in cognitive abilities like memory and attention affecting academic performance. Child and adolescent mental health (CAMH) is a growing concern all over the world. Mindfulness practices have not only been helpful in improving emotional quotient of an individual but its regular practice has also remarkably impacted awareness levels and attention in children.

The present study hypothesized that practicing Sanskrit chanting as a mindfulness tool also identifying the benefits of the specific characteristic of chanting called *Chanda*/meters or Sanskrit prosody on equipping adolescents with better psychological health and improved cognitive abilities. The purpose was multi-fold

1. To have scientific evidence that *Chandas*/Sanskrit prosody (specific rhythms and pauses) has its own effect irrespective of the language, music, words or their meaning while chanting a *shloka* and validating its benefits mentioned in our ancient texts.
2. To make a study design that can identify the impact of the *Chandas*/prosody aspect of chanting and eliminating the factors like language, meaning of the phrase etc.
3. With this preliminary study and considering one type of *Chanda*, opening gates for researchers to further explore all kinds of *Chandas* to its maximum potential.
4. If the results matched our hypothesis, then we would like to conduct further study for children with special needs mainly ADHD and Autism spectrum disorder.

Aims and Objectives

Aim

To study the effect of Chanda/Sanskrit prosody on cognitive abilities, mindfulness, anxiety and self-concept among adolescents.

Objectives

1. To find the impact of Chanda/Sanskrit prosody on positive and negative emotions in school-going adolescents.
2. To find the impact of Chanda/Sanskrit prosody on cognitive performance in school-going adolescents.
3. To identify the impact of Chanda/Sanskrit prosody on Anxiety, mindfulness and self-concept in school-going adolescents.

Research Question

Does Chanda/Sanskrit prosody have any impact on emotions, cognitive performance, anxiety, mindfulness and self-concept scales in school-going adolescents?

Hypothesis

1. Chanda/Sanskrit prosody has helpful effect on positive and negative emotions in school-going adolescents.

2. Chanda/Sanskrit prosody has positive impact on cognitive performance in school-going adolescents.

3. Chanda/Sanskrit prosody has positive impact on anxiety, mindfulness and self-concept scales in school-going adolescents.

Null Hypothesis

1. Chanda/Sanskrit prosody has no effect in positive or negative emotions in school going adolescents.
2. Chanda/Sanskrit prosody has no impact on cognitive performance in school-going adolescents.
3. Chanda/Sanskrit prosody has no impact on anxiety, mindfulness and self-concept scales in school-going adolescents.

Method:

Participants

Participants for the study were appointed from a CBSE School called Samsidh Mount Litera Zee School, from Urban Bangalore, India. Children from grades 7 and 8 who met the inclusion criteria were allocated into 4 groups of the study. Randomization for groups could not be done as these kids already were in 4 different sections and shuffling them during school hours was not permitted.

Sample size

This sample size was obtained by calculating the Effect size as 0.94, fixing alpha as "0.05", power of the study as 0.8, based on the previous study (Telles et al., 2017). But considering the rate of drop out and conduct an appropriate statistical analysis, a sample size of 120 participants was considered for the proposed research.

Design

The design of the study was a four-armed control trial. The intervention period was 5 days a week for all four groups for one month. Baseline and post intervention data was collected in the school premises before and after 30 days.

Assessments

The outcome measures comprised of (a) Positive and Negative Affect Scale for Children, (b) Stroop Color-Word Test, (c) Digit Letter Substitution Test, (d) Spence Children's Anxiety Scale, (e) Mindfulness Attention Awareness Scale for Children and (f) Children's Self-concept Scale.

Data analysis:

The study aimed to test the hypothesis that chanting or humming slokas/mantras in a *Chanda* is associated with significant differences in post intervention mean± SD to pre intervention values of children's self-concept scale, anxiety, emotions, sustained attention, executive function, mindfulness and awareness in adolescence. Continuous variables were reported as mean ± SD, categorical variables as the frequency with percentage. For continuous outcomes, within-group pre-post comparisons were made by paired 't' test and for between-group comparisons, two-sample 't' test was used to compare outcomes at baseline and follow-up. All comparisons were two-sided. $p < 0.05$ was set as the cut-off of statistical significance. A post hoc analysis was run to assess the superiority of group effect on each variable. STATA version 14.2 was used for statistical analysis.

Result

PANAS-C

There was no difference in both domains of PANAS in within group analysis. However, the positive affect was statistically significant when compared between the groups ($p<0.01$). A post-hoc analysis revealed the superiority of the CM and HM groups in positive affect alone when compared with other two groups.

DLST and Stroop Test

Within-group analysis using sample t-test demonstrated significant changes in HC, CS, and SS groups ($p<0.001$) with DLST scores. Post-hoc analysis revealed that the CS group had higher scores; however, there were no differences between the HC and CS groups. Stroop scores improved in all groups except for the SS group. Post-hoc analysis to examine the superiority between groups presented a higher statistical significance in CS group when compared to HC group. A statistical significance was also observed between the chanting and SS group. There were statistical differences within the group in both HC and CS groups in the Stroop mistake scores, but no differences were observed between groups.

Anxiety, MAAS-C and Self-concept

A significant change was noticed in the domains of anxiety, Intellectual and school status, physical appearance and attributes, and the total scores of the self-concept scale in all the four groups after the interventions. On pairwise group comparisons, the change in the domain of anxiety was significant for the Chanting vs English phrase reading, Chanting vs Humming and Chanting vs Silent sitting ($p<0.05$). When intellectual and school status for English phrase reading was compared to Silent sitting group, a significant difference was depicted ($p<0.05$). Also, Physical appearance and attributes scores and total scores were found significantly improved for Chanting vs Humming but only total scores in humming vs Silent sitting groups.

There was a significant change in all the domains except happiness and satisfaction after chanting ($p<0.01$). However, participants in the English phrase reading group also showed a significant increase in the scores of anxiety and total scores of the Self-concept scale after intervention ($p<0.01$ and $p=0.03$). There was reduction in the anxiety levels for the humming group whereas increase in all anxiety scores in the remaining three groups.

Conclusion

Humming of Sanskrit prosody has reported an overall reduction in anxiety levels when compared to the remaining three groups. However, there was a decrease in the anxiety levels in the chanting group as well. There was a significant increase in mindfulness scores in the humming as well as chanting groups. Also, there was no change observed in the self-concept scales in the humming group. Beside this, mantra chanting and only humming the prosody without verse, had a similar effect on both emotional personality features of positive and negative effect. The results also suggest amelioration in the positive affect following chanting and humming the prosody, although there were no changes in the negative effect.

Keywords: *Sanskrit-prosody, Chanda, Adolescence, Self-concept, Anxiety, Mindfulness, positive & Negative affect, Mindfulness, sustained attention and Stroop effect.*

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