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Role of Pranava Mantra Japa as an adjunct to Surya Namaskara in the Management of Competitive Examinations related Anxiety among Adolescents

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ABSTRACT

Background: Anxiety related to competitive examinations is a significant concern among adolescents, often impairing focus, study efficiency, and overall well-being. Yoga practices such as Surya Namaskara and Pranava Mantra Japa have individually shown promise in reducing anxiety and enhancing mental balance. However, the combined effect of these practices in managing examination-related anxiety has not been explored. This study aimed to evaluate the role of Pranava Mantra Japa as an adjunct to Surya Namaskara in reducing anxiety among adolescents preparing for competitive examinations.

Methods: A total of 150 students (aged 15–20 years) preparing for competitive examinations in Kota, Rajasthan, were recruited using purposive sampling. Participants were randomly assigned to three equal groups (n=50 each): Group A: Control (no intervention), Group B: Surya Namaskara only (10 rounds daily), Group C: Surya Namaskara with adjunct Pranava Mantra Japa (10 rounds for each daily). The intervention was conducted over two months under trained instructors. Anxiety levels were assessed pre- and post-intervention using the State-Trait Anxiety Inventory. Data were analyzed using RM-ANOVA with Bonferroni post hoc tests.

Results: No significant correlation was found between baseline anxiety and sleep or study duration ($p > 0.05$). RM-ANOVA revealed a significant main effect of time ($F(1,147)=129.88$, $p<0.001$, partial $\eta^2=0.469$), a significant main effect of group ($F(2,147)=15.24$, $p<0.001$, partial $\eta^2=0.172$), and a significant time×group interaction ($F(2,147)=24.55$, $p<0.001$, partial $\eta^2=0.250$). Post hoc comparisons showed that Group C exhibited significantly greater reductions in anxiety compared to Group A (mean difference=4.69, $p<0.001$) and Group B (mean difference=2.66, $p=0.006$). No significant difference was observed between Group A and Group B ($p=0.055$).

Conclusion: The integration of Pranava Mantra Japa with Surya Namaskara significantly reduced anxiety levels in adolescents preparing for competitive examinations, demonstrating greater efficacy than Surya Namaskara alone. This combined yogic approach offers a safe, cost-effective, and holistic adjunct for managing examination-related anxiety in youth.

Keywords: *Pranava Mantra Japa; Surya Namaskara; Examination Anxiety; Adolescents; Yoga Intervention; Mental Health*

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1. INTRODUCTION

Human beings are unique among all living creatures due to their ability to think, learn, and grow intellectually. These abilities help us progress in many areas such as education, technology, and creativity [1]. However, with growth and advancement come challenges. In today's competitive world, students - especially those preparing for entrance and competitive exams - face increasing pressure to perform. This often leads to mental strain, anxiety, and stress [2]. Technological advancements have made life more convenient, but they have also contributed to a rise in mental health issues among the youth [3]. The pressure to succeed, parental expectations, and academic workload often result in anxiety-related problems. Studies show that many students experience anxiety and emotional difficulties during exam periods, which negatively affect their ability to focus, study, and maintain a healthy lifestyle. This, in turn, impacts their academic performance and overall well-being [4]. Mental health problems such as stress and anxiety are becoming more common across the world. According to global health reports, these conditions not only affect individuals but also have a larger impact on society, such as reduced productivity and increased health care costs [5]. In India, the situation is especially concerning as a large percentage of the student population experiences exam-related anxiety and psychological distress. To tackle these issues, it is important to look beyond conventional medical treatments and consider holistic approaches. Yoga has long been recognized as a natural and effective way to reduce anxiety and promote mental balance [6]. Practices like Surya Namaskar and Pranava Japa are simple yet powerful techniques that can help calm the mind, improve focus, and enhance emotional stability [7–9]. However, a major research gap exists that while both Surya Namaskar and Pranava Japa have individually been studied for their mental health benefits [8–14], no known study has specifically explored the add-on effect of Pranava Japa when practiced alongside Surya Namaskar in reducing anxiety. This study is designed to fill that gap and provide empirical evidence on whether combining the two practices offers greater benefits than either alone. The primary aim of this study is to assess whether ancient yogic practices - specifically Pranava Japa and Surya Namaskar - can serve as effective tools in managing academic anxiety and enhancing mental health among students preparing for competitive examinations. These traditional practices are explored not just as physical or meditative routines, but as holistic methods that may help students build resilience and emotional balance in high-pressure academic settings. To achieve this aim, the study was guided by the following specific objectives.

1. (a) To assess the baseline anxiety levels among students engaged in competitive exam preparation and (b) find out the correlation between baseline anxiety score and sleep and study duration.

2. To evaluate the individual and combined effects of Pranava Japa and Surya Namaskar on reducing perceived anxiety.

2. MATERIAL AND METHODS

2.1. Participants

150 students, preparing for competitive examinations in various coaching centers and studying in higher secondary in any school in Kota, Rajasthan, India were recruited in the study using purposive sampling after obtaining a written informed consent.

2.2. Study design

This study employed a pre-test–post-test control group design to evaluate the effects of Surya Namaskara and Pranava Japa on anxiety among adolescents preparing for competitive examinations. Participants were randomly assigned to one of three groups: a control group, a Surya Namaskara-only group, and a combined Surya Namaskara with Pranava Japa group. This design enabled both within-group and between-group comparisons over the intervention period.

2.3. Inclusion and exclusion criteria

2.3.1. Inclusion criteria

- Students of age range between 15 to 20 years
- Diagnosed with mild anxiety
- Willing to take part in the study and give written consent
- Able to understand either Hindi or English language

2.3.2. Exclusion criteria

- Having any other serious mental or physical condition
- Diagnosed with severe anxiety
- Practiced any kind of yogic practice in last six months

- Fails to give written consent
- Having suicidal tendency

2.4. Intervention protocol

The intervention lasted for a fixed duration of two months, and sessions were conducted under the supervision of trained yoga instructors. Control group (group A) received no intervention but the Surya Namaskara only group (group B) received practice of ten rounds of Surya Namaskara at slow pace daily in the morning lasting about half an hour. The Pranava Japa along with Surya Namaskara group (group C) received Pranava Mantra chanting ten times in addition to ten rounds of Surya Namaskara lasting about forty minutes.

2.5. Assessment

Sociodemographic data along with general information of the participants were recorded at the beginning of the intervention. Anxiety scores (using State-Trait Anxiety Inventory) were measured at the beginning as well as at the end of the intervention at two months.

2.6. Data analysis

Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics were used to summarize participant characteristics. Correlation analysis was carried out using Pearson (parametric data) and Spearman (non parametric data) tests. Paired sample t-tests were used to assess within-group changes, and Repeated Measures - Analysis of Variance (RM-ANOVA) was employed to compare differences across groups.

3. RESULTS

A total of 181 students were screened, and 150 including 41 females were selected for the study based on the inclusion and exclusion criteria. The remaining 31 students were excluded due to factors such as moderate to severe anxiety levels, ongoing psychological or physical health conditions, prior engagement in yoga practices, or unwillingness to provide informed consent. The final sample was randomly allocated into three equal groups of 50 participants each: a control group, a Surya Namaskara group, and a Surya Namaskara with Pranava Japa group. No dropout was recorded in any of the groups. Characteristics of the participants are shown in following table 1 and 2 which shows that 109 participants (72.66%) were male and 41 (27.33%) were female. Group A consisted of 74% males, group B 78% males, and group C 66% males. Regarding type of family, 52% of participants were from nuclear families and 48% from joint families. In group A, 66% belonged to nuclear families; in group B, 42%; and in group C, 48%. The presence of family history of psychological disorders was low across all groups, with 134 participants (89.3%) reporting no such history and 16 (10.7%) reporting a positive family history. The mean age of participants was 17.01 ± 0.72 years. Group-wise, the average ages were 16.74 ± 0.78 years for group A, 17.04 ± 0.67 years for group B, and 17.26 ± 0.63 years for group C, indicating a comparable age distribution across groups. The average height was 164.66 ± 8.83 cm for the total sample, with group A having a mean height of 163..33 ± 8.71 cm, group B at 164.59 ± 10.05 cm, and group C at 166.06 ± 7.57 cm. The mean weight was 53.64 ± 10.43 kg, with group A showing the highest mean (54.69 ± 10.24 kg), followed by group B (54.46 ± 10.51 kg), and group C (51.76 ± 10.48 kg). The mean sleeping duration across the entire sample was 7.43±1.27 hours per night. Group B reported slightly higher sleep duration (7.66 ± 1.61 hours) compared to group A (7.32 ± 1.10 hours) and group C (7.30 ± 1.00 hours). However, notable differences were observed in study duration. The total average was 5.65±1.94 hours, but group A reported the highest average study time (6.06 ± 2.33 hours), while groups B and C reported lower durations (5.44 ± 1.74 hours and 5.44 ± 1.67 hours, respectively). Most importantly, the entire population reported a mean anxiety score of 46.57±4.76. Groupwise it was 45.86±4.71, 47.10±4.42, and 46.74±5.13 for group A, B and C respectively. One-way ANOVA reveals that there is no significant difference in height (f-value=1.20, p-value=0.31), weight (f-value=1.22, p-value=0.30), sleep duration (f-value=1.3, p-value=0.28), study duration (f-value=1.71, p-value=0.18) and anxiety ((f-value=0.90, p-value=0.41)) in all the groups at the baseline which suggest that all the three groups were comparable at baseline, however the age (f-value=7.04, p-value=0.001) was significant different in all the groups. Overall, the baseline characteristics across the three groups were generally comparable, supporting the appropriateness of group comparisons in subsequent inferential analyses.

3.1. Correlation of sleep and study duration to baseline anxiety level

One of the objectives of the study was to find out the anxiety score of the students preparing for competitive examinations at coaching centers and to find out the correlation among anxiety scores, sleep duration and study hours. Pearson correlation test revealed that there is no correlation of sleep duration with anxiety ($R = -0.070$, $p = 0.391$). Also, there is no correlation of study duration with anxiety ($R = -0.130$, $p = 0.113$).

3.2. Effect of time, groups, interaction of time and group on anxiety and post hoc comparisons

A 3 (Group: A, B & C) × 2 (Time: Pre-test & Post-test) mixed-design ANOVA was conducted to examine whether there was a significant effect of the interventions on anxiety scores over time. The results showed that there was a statistically significant main effect of time, $F(1,147) = 129.88$, $p < 0.001$, partial $\eta^2 = 0.469$, indicating that anxiety scores changed significantly from pre-test to post-test when collapsing across all three groups. The large effect size suggests a substantial change in anxiety levels over time. There was also a statistically significant main effect of the group, $F(2,147) = 15.24$, $p < 0.001$, partial $\eta^2 = 0.172$, indicating that, when collapsing across time points, the three intervention groups differed significantly in their overall anxiety scores. This medium-to-large effect size shows meaningful differences among the groups. Importantly, the interaction between time and group was statistically significant, $F(2,147) = 24.55$, $p < 0.001$, partial $\eta^2 = 0.250$. This indicates that the pattern of change in anxiety over time was not the same across all groups suggesting that the effectiveness of the interventions differed, with some groups showing greater reductions in anxiety than others. The interaction effect size (partial $\eta^2 = 0.250$) is large, highlighting a strong differential effect of the interventions on anxiety reduction over time. Bonferroni-adjusted pairwise comparisons for the Group effect showed that Group C had significantly lower anxiety scores compared with both Group A (mean difference = 4.69, $p < 0.001$, 95% CI [2.63, 6.75]) and Group B (mean difference = 2.66, $p = 0.006$, 95% CI [0.60, 4.72]). There was no significant difference between Group A and Group B (mean difference = 2.03, $p = 0.055$). Taken together, these findings demonstrate that all three interventions were associated with reduced anxiety over time, but the magnitude of reduction differed by group, with Group C showing the greatest overall improvement in anxiety scores.

4. DISCUSSION

The present study aimed to evaluate the distinct and combined effects of two traditional yoga practices: Surya Namaskar and Pranava Japa integrated with Surya Namaskar. These interventions were compared against a control group to understand their impact anxiety. The participants who practiced both Pranava Japa and Surya Namaskar, showed significantly lower anxiety scores than both Group A (control) and Group B (Surya Namaskar alone) indicating that Pranava Japa, in addition to the Surya Namaskara, plays an important role in decreasing competitive examination related anxiety. A study by Kalyani et al. elaborating the neurohemodynamic correlates of om chanting indicates the deactivation of the limbic system during the chanting [15]. Another study involving bus drivers found that those who practiced Om chanting for four weeks experienced a significant reduction in anxiety levels compared to a control group that did not engage in the practice [12]. The results of our study falls inline with a randomised control trial by Rajagopalan et al. on hypertensive patients who practiced Om chanting and Yoga Nidra showed a significant reduction not only in anxiety but also in depression, and stress levels [10]. Not only hypertensive patients but also office workers participating in Om chanting sessions during covid pandemic reported a significant decrease in psychological distress and an enhancement in quality of life [16]. Singh M identified om chanting as the best treatment for reducing anxiety levels in college students when compared to Pran Dharana [17]. Interestingly our study finds no significant difference between Group A and Group B, which suggests that doing Surya Namaskar alone did not reduce anxiety as much as combining it with Pranava Japa though there are numerous studies which suggests benefits of Surya Namaskara in improvement of mental health by reducing stress [18,19], educational anxiety [20,21] though it was compared to Krida Yoga, improving relaxation, and enhance overall well-being [21]. It also showed positive results in physical fitness[19]. The combination of Pranava Japa with Surya Namaskar (Group C) was the most effective in reducing anxiety. This highlights the potential benefit of integrating a meditative practice like Pranava Japa with physical practices like Surya Namaskar to achieve greater mental health benefits. The study's design incorporated several strengths that enhance the credibility of its findings. The inclusion of a control group was paramount, providing a robust baseline against which the effects of the interventions could be reliably compared. Furthermore, the comprehensive assessment across physiological, physical, and psychological parameters allowed for a holistic understanding of the interventions' impacts. The direct comparison between a single intervention (Surya Namaskar) and a combined intervention (Pranava Japa with Surya Namaskar) was particularly valuable, enabling the identification of specific, additive benefits. While insightful, this study provides a foundation for further inquiry. The generalizability of these findings would benefit from larger, multi-center trials involving more diverse populations, including older adults, individuals with specific health conditions, and participants from various cultural backgrounds. The current study demonstrates what happened, but future research could delve deeper into how these benefits occur. This includes exploring underlying biological mechanisms, such as changes in brain activity, hormone levels, inflammatory markers, and detailed autonomic nervous system activity, especially to elucidate the unique psychological effects of Pranava Japa. Additionally, the optimal dosage and frequency of these practices warrant further investigation. Future studies could explore different durations, intensities, and frequencies of Surya Namaskar and Pranava Japa to identify the most effective protocols. Finally, while the 12-week duration provides valuable insights into acute and short-term effects, longer-term follow-up studies are essential to assess the sustainability of the observed benefits and to understand any potential cumulative effects over extended periods. Acknowledging these areas for further research demonstrates scientific rigor and provides a roadmap for advancing knowledge, ensuring that these initial findings are built upon to create a more complete understanding and a stronger evidence base for public health recommendations.

5. CONCLUSION

This study shows that anxiety levels reduced significantly from pre-test to post-test across all participants, but the amount of reduction depended on the type of intervention. Among the three groups, the combination of Pranava Japa with Surya Namaskar (Group C) led to the greatest improvement in anxiety scores. Surya Namaskar alone (Group B) showed some improvement but was not significantly different from the control group (Group A). These findings suggest that integrating a meditative practice such as Pranava Japa with a physical practice like Surya Namaskar can be a more effective approach for reducing anxiety than either practice alone. Future research can explore these interventions over longer durations and in different populations to strengthen the evidence.

CrediT authorship contribution statement

Mona Soni: Writing, Original draft, Methodology, Formal analysis, Investigation, Resources, Data curation, Dr. Raghvendra Chaturvedi : Software, Visualization, Funding acquisition. , Dr. Dharambir Yadav: Conceptualization, Methodology, Software, Formal analysis, Resources, Seema Yadav: Review & Editing, Supervision, Project administration.

Conflict of interest

The authors declare that they have no conflicts of interest.

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Data availability

The data that support the findings of this study are available from the corresponding author and will be shared on reasonable request.

Table 1: Descriptive and One-way ANOVA result

Variable	Total	Group A	Group B	Group C	One-way ANOVA (F-value, *p*-value)
Age (years)	17.01±0.72 [16.90, 17.13]	16.74±0.78 [16.52, 16.96]	17.04±0.67 [16.85, 17.23]	17.26±0.63 [17.08, 17.44]	7.04, 0.001
Height (cm)	164.66±8.83 [163.24, 166.09]	163.33±8.71 [160.86, 165.81]	164.59±10.05 [161.74, 167.43]	166.06±7.57 [163.91, 168.21]	1.22, 0.30
Sleep Duration (hour)	7.43±1.27 [7.22, 7.63]	7.32±1.10 [7.01, 7.63]	7.66±1.61 [7.20, 8.12]	7.30±1.00 [7.02, 7.58]	1.28, 0.28
Study Duration (hour)	5.65±1.94 [5.33, 5.96]	6.06±2.33 [5.40, 6.72]	5.44±1.74 [4.95, 5.93]	5.44±1.67 [4.97, 5.91]	1.71, 0.18
Weight (kg)	53.64±10.43 [51.96, 55.32]	54.69±10.24 [51.78, 57.60]	54.46±10.51 [51.48, 57.45]	51.76±10.48 [48.78, 54.74]	1.11, 0.33
Anxiety	46.57±4.76 [45.80, 47.33]	45.86±4.71 [44.52, 47.20]	47.10±4.42 [45.84, 48.36]	46.74±5.13 [45.28, 48.20]	0.90, 0.41

Table 2: Frequency distribution of the participants

Sex				
Male (n, %)	109, 72.66	37 (74%)	39 (78%)	33 (66%)
Female (n, %)	41, 27.33	13 (26%)	11 (22%)	17 (34%)
Type of Family				
Single (n, %)	78, 52	33, 66	21, 42	24, 48
Joint (n, %)	72, 48	17, 34	29, 58	26, 52
Family History (No, Yes)	134, 16	46, 4	42, 8	46, 4

Table 3: RM - ANOVA and Bonferroni post hoc comparison between groups for anxiety scores

RM - ANOVA results					Boneferroni post hoc comparisons			
Effect	**df**	**F**	**p**	**Partial η²**	Groups	Mean Difference	p	95% CI
Time	1,147	129.88	< 0.001	0.47	A vs B	2.03	0.055	[–0.03, 4.09]
Group	2,147	15.24	<0.001	0.17	A vs C	4.69	< 0.001	[2.63, 6.75]
Time × Group	2,147	24.55	< 0.001	0.25	B vs C	2.66	0.006	[0.60, 4.72]

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