

Effects of Suryanamaskara and Sheetali Pranayama on College Students Aggression: A Prospective Interventional Study

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ABSTRACT

Introduction: Students today face a more fast-paced and demanding lifestyle due to heavy workloads and hectic schedules. By using the potential of Suryanamaskara, a dynamic sequence of yoga postures known for its energising and calming effects, along with Sheetali Pranayama, a cooling breathing technique that promotes relaxation and reduces stress, this study contributes to the growing body of research on non-pharmacological interventions for emotional regulation in adults. The focus of this research is the effects of Suryanamaskara and Sheetali Pranayama on reducing aggression levels in college students.

Aim: To investigate the effects of Suryanamaskara and Sheetali Pranayama in reducing aggression levels in college students.

Materials and Methods: This prospective interventional study employed a stratified purposive random sampling design to evaluate the efficacy of Suryanamaskara and Sheetali Pranayama in reducing aggression levels among college students. Voluntary participants were initially screened using the Buss and Perry Aggression Questionnaire (AQ) and those who exhibited high aggression scores were selected for the intervention training programme. A total of 54 participants were randomly assigned to two experimental groups. Group 1 underwent a Suryanamaskara intervention, while Group 2 engaged in Sheetali Pranayama, both incorporating Sukshma Vyayama and a cooling down period

within the framework. Intervention sessions lasted 45 minutes, five days a week, for 10 weeks. Aggression levels were assessed pre- and post-intervention and paired sample t-tests and independent sample t-tests were used for statistical analysis.

Results: The findings of this study demonstrate a significant reduction in aggression levels among college students following a 10-week yoga intervention programme, with the mean difference in aggression scores between pre- and post-intervention being 14.40 for the Suryanamaskara group and 17.29 for the Sheetali Pranayama group, indicating a decrease in aggression levels. Both the Suryanamaskara and Sheetali Pranayama groups exhibited notable improvements in aggression scores as measured by the Buss and Perry AQ. However, a comparative analysis using independent sample t-tests and effect size showed that the pretest t-statistics were -1.59 (p-value=0.11) and for the post-test t-statistics were -1.16 (p-value=0.24), revealing no significant differences between the groups for either pretest or post-test scores (p-value>0.05).

Conclusion: This experimental study demonstrated a significant reduction in aggression levels among college students following a 10-week intervention with either Suryanamaskara or Sheetali Pranayama programmes. A comparative analysis revealed equivalent changes in aggression levels between the two groups, indicating that both yogic interventions were equally effective in reducing aggression in college students.

Keywords: Emotional state, Stress, Yoga, Yogic intervention

INTRODUCTION

The contemporary lifestyle of college students, characterised by heavy workloads, multiple commitments and interpersonal tensions, can contribute to chronic stress. This stress, in turn, can manifest as aggression, along with other physical and mental health issues. Balancing multiple tasks, such as college assignments, part-time jobs, social activities and tensions with family and peers, can be quite challenging. This constant pressure to meet deadlines and succeed can lead to increased stress, frustration and a poor work-life balance [1]. Prolonged exposure to stress leads to increased cortisol hormone secretion and depleted emotional resources, like motivation, empathy, concentration, diminished patience and increased irritability [2,3]. Due to this, students may sometimes choose aggression as a coping mechanism, resulting in behavioural changes or vice versa. These changes can increase the risk of various physical and mental health problems, including anxiety, depression, digestive issues, headaches, muscle tension and pain, heart disease, hypertension, heart attacks, sleep problems, weight gain, impaired concentration and a weakened immune system [4-7]. Although aggression is a complex human behaviour with multifaceted causes, it can be studied and managed in various ways [8]. In fact, healthy aggression can be beneficial when

used for self-defense, protecting others, or as a motivational drive to assert rights and express needs assertively [9,10]. The problem arises when aggression becomes uncontrollable and escalates into violence, potentially causing emotional or physical harm [11].

It's important to recognise that aggression itself is a symptom, not the root cause. Underlying emotional states like frustration, fear and anxiety often trigger aggressive behaviour [11]. Research has established a strong link between chronic aggression and various negative health consequences. Studies show a significant correlation between aggression and Coronary Heart Disease (CHD), atherosclerosis, tachycardia (rapid heart rate) and hypertension (high blood pressure) [12-15].

Understanding the underlying root causes of aggression-biological, psychological and socio-cultural-economic factors-is key to prevent aggression from escalating into violence and causing harm. Biology is a critical determinant of aggression through genetics, testosterone levels and stress-related neurotransmitter depletion, like serotonin, which lowers frustration tolerance [16,17]. Psychologically, aggression can stem from acute stress, personality disorders, or feelings of fear, threat, or lack of control [18]. Additionally, social and economic factors, like interpersonal issues, social pressures and economic hardship, can contribute to aggression.

Consequently, it can be said that a student cannot control every triggered response, so it's natural to become frustrated and upset from time to time, which may lead to responding aggressively in certain situations. However, if aggression remains untreated, it can affect daily life challenges, interactions and relationships. Numerous studies have shown that aggression can be managed and even trained. Strategies that can help manage aggression include compassion and support, cognitive-behavioural therapy, dialectical behaviour therapy, parenting tactics and relaxation techniques, which have been used as traditional methods for managing aggression [19,20].

Yoga, a multifaceted discipline encompassing physical postures, breathing exercises and meditation, has gained attention for its potential in promoting emotional regulation and wellbeing [21]. Beyond other therapies, yoga provides a complementary approach to aggression management by addressing the mind-body connection and fostering inner peace, which can regulate biological, psychological and socio-cultural-economic factors in one way or another. On a global scale, yoga is recognised as a non pharmaceutical therapy for managing aggression [22]; it may help regulate hormones by eliminating the biological and psychological causes of aggression [23]. While research suggests that yoga, including asanas and pranayama, reduces aggression [22], no studies have isolated the specific effects of Suryanamaskara and Sheetal Pranayama on college students' aggression. Therefore, this study was conducted with the aim of examining the effects of Suryanamaskara and Sheetal Pranayama on the aggression levels of college students.

MATERIALS AND METHODS

This prospective interventional study was conducted at the Amity School of Physical Education and Sports Sciences, Amity University, Noida, Uttar Pradesh, India, over a 10 week period from March to May 2023. Before commencing the intervention programme of the study, written informed consent was obtained from all participants after they were fully informed about the study's procedures. Ethical clearance was also obtained from the Department Research Committee (DRC) in accordance with the ethical policy of the institute.

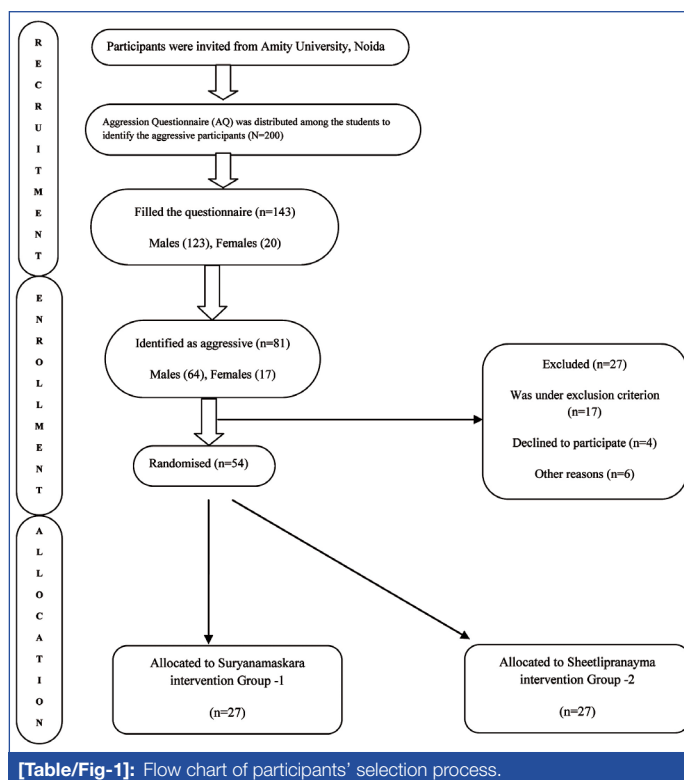
Inclusion criteria: Aggressive male and female undergraduate students aged between 17 and 25 years from the Amity School of Physical Education and Sports Sciences, Amity University, Noida, Uttar Pradesh, were included in the study.

Exclusion criteria: To ensure participant safety and suitability for the yoga intervention, a set of exclusion criteria was applied. Students with vertigo or severe cervical spondylosis, back conditions such as sciatica and slipped disc, any recent abdominal surgery, knee problems, hernias, intestinal tuberculosis, or those who were taking any kind of medication were excluded from the study.

Sample size calculation: The sample size was calculated using the formula $n = (Z^2 * p * q) / E^2$, where $Z = 1.96$ for 95% confidence, considering the prevalence of aggression as $p = 0.566$ ($81/143 = 0.566$ or 56.6%), $q = 1 - p$ and E is the margin of error i.e., 0.1 [24]. By plugging the values in the formula, $n = 53.45$. The result indicated a required sample size of approximately 54. A stratified purposive random sampling design was used in the present study.

Selection of participants: Following the application of the exclusion criteria, 27 students were excluded from the initial pool of 81 aggressive participants, resulting in a final sample size of 54 for the yoga intervention [Table/Fig-1]. The 54 identified participants were then randomly assigned to two intervention groups using a simple randomisation technique. Group 1 consisted of 27 participants who practiced Suryanamaskara, while Group 2 consisted of 27 participants who practiced Sheetal Pranayama.

The first stage of the study involved screening participants with elevated aggression levels. A sample of 143 undergraduate students (123 males and 20 females) enrolled at Amity University, Noida, Uttar



[Table/Fig-1]: Flow chart of participants' selection process.

Pradesh, voluntarily completed the AQ (Buss AH & Perry M, 1992) [19]. Of these, only 81 were identified as statistically aggressive.

Data collection tool: The AQ developed by Buss AH and Perry M (1992) is a self-report inventory widely used to assess multiple dimensions of aggression in adults and no permission is needed when the questionnaire is used for research purposes. This well-validated measure consists of 29 items employing a Likert-scale response format, ranging from "extremely uncharacteristic of me" to "extremely characteristic of me," to measure four subscales: Physical Aggression (PA), Verbal Aggression (VA), Anger (A) and Hostility (H). The AQ yields total scores ranging from 29 to 145. According to the user manual, scores above 77.8 for males and 68.2 for females indicate aggressive tendencies [25].

Intervention administration: A 10 week customised yoga intervention programme was developed for both groups, incorporating a warm-up phase, main activity and cool-down period. A certified yoga trainer delivered and supervised the programme five days per week for 45 minutes per session for both groups separately. The programme structure remained consistent across both groups: five minutes of mantra chanting, followed by a 15-minute Sukshmayayama warm-up. The main activity differed between the groups; Group 1 (Suryanamaskara group) practiced Suryanamaskara for 15 minutes, while Group 2 (Sheetali Pranayama group) practiced seven rounds of Sheetal Pranayama for 15 minutes. Both groups concluded each session with a 10-minute cool-down period of Shavasana. To minimise external influences, the intervention programme was conducted during the morning hours for all participants.

Data collection: An electronic version of the AQ (Buss AH & Perry M, 1992) was administered to all participants via a Google Form. Before completing the questionnaire, participants were provided with a detailed explanation of the study's objectives and thorough instructions regarding the questionnaire format and response scale. They were instructed to rate each statement according to their personal experiences on a scale of five. Data collection occurred at two time points:

Preintervention: All participants completed the AQ (Buss AH & Perry M, 1992) during a designated session before the intervention programme commenced. This initial assessment established a baseline measure of aggression for each participant.

Postintervention: Following the completion of the 10-week intervention programme, participants were again administered the AQ using the same electronic format and procedures as the preintervention assessment. This allowed for a direct comparison with the baseline data and an evaluation of potential changes in aggression levels attributable to the intervention programme.

STATISTICAL ANALYSIS

To evaluate the effectiveness of the yogic intervention programmes on the aggression levels of college students, the analysis utilised the Statistical Package for Social Sciences (SPSS version 16.0). Descriptive analyses were conducted to compare the means and standard deviations in order to understand the level of variability in aggression scores within each group prior to the intervention. Furthermore, paired sample t-tests were performed to compare pre- and postintervention scores for each group separately. This statistical technique was employed to analyse the changes in aggression scores over time (preintervention and postintervention) for both the Suryanamaskara and Sheetal Pranayama groups. Additionally, an independent sample t-test and effect size were computed to determine if the impact of the yogic intervention differed significantly in aggression levels between the two groups and to identify which group exhibited a more substantial reduction.

RESULTS

[Table/Fig-2] presents the demographic characteristics of the participants. The mean±SD age of the participants in Group 1 was 20.96±1.67 years and in Group 2, it was 21.18±1.56, with 22 males and five females in each group.

| Variables | Group 1 | Group 2 | p-value |
|---------------------|-----------------------|-----------------------|---------|
| Mean age (years) | 20.96±1.67 | 21.18±1.56 | 0.60 |
| Gender distribution | Male: 22 Female: 5 | Male: 22 Female: 5 | >0.99 |

[Table/Fig-2]: Demographic details of participants.

The descriptive analysis of both groups exhibited comparable mean aggression levels, with the Suryanamaskara group reporting a slightly lower mean (M=94.70) compared to the Sheetal Pranayama group (M=100.18). The standard deviations for both groups were relatively similar, suggesting a comparable level of variability in aggression scores within each group prior to the intervention. A notable decrease in mean aggression levels was observed for both groups following the intervention. The Suryanamaskara group demonstrated a more substantial reduction in aggression (M=80.29) compared to the Sheetal Pranayama group (M=86.48). While the standard deviations increased slightly postintervention for both groups, the overall pattern suggests a reduction in aggression levels across the sample [Table/Fig-3].

| Groups | Aggression level | Mean±Std. Deviation |
|--------------------------|------------------|---------------------|
| Surya-namaskara group | Pre | 94.70±12.03 |
| | Post | 80.29±20.69 |
| Sheetali pranayama group | Pre | 100.18±13.16 |
| | Post | 86.48±18.10 |
| Total | Pre | 97.44±12.79 |
| | Post | 83.38±19.51 |

[Table/Fig-3]: Descriptive statistics of aggression levels in participants.

Moreover, to examine the within-group impact of the intervention on aggression levels, paired sample t-tests were conducted to compare pre- and postintervention scores for each group separately. Both the Suryanamaskara intervention and the Sheetal Pranayama group demonstrated a significant reduction in aggression scores (p-value<0.01) [Table/Fig-4].

| Groups | Paired differences | T | df | Sig (2-tailed) |
|------------------------|---------------------|------|----|----------------|
| | Mean±Std. Deviation | | | |
| SN_Pre - SN_Post | 14.40±22.73 | 3.29 | 26 | <0.01* |
| PRNYM_Pre - PRNYM_Post | 17.29±19.25 | 4.66 | 26 | <0.01* |

[Table/Fig-4]: Paired sample t-test for analysis of aggression levels between pre- and post-tests of Suryanamaskara and Sheetal Pranayama Groups.
*Significant at p<0.01

Additionally, an independent sample t-test was calculated to determine if the impacts of the yogic interventions differed significantly on aggression levels between the two groups and to identify which group exhibited a more substantial reduction. No significant differences were observed between groups for either pretest or post-test scores (p-value>0.05). The findings suggest that both yogic intervention programmes are equally effective in mitigating aggression levels [Table/Fig-5].

| | Sig | t | df | Sig (2-tailed) | Mean difference | Std. error difference | 95% confidence interval of the difference | |
|-------------------|------|-------|----|----------------|-----------------|-----------------------|-------------------------------------------|-------|
| | | | | | | | Lower | Upper |
| Pretest SN & SP | 0.66 | -1.59 | 52 | 0.11 | -5.48 | 3.43 | -12.36 | 1.40 |
| Post-test SN & SP | 0.68 | -1.16 | 52 | 0.24 | -6.18 | 5.29 | -16.80 | 4.43 |

[Table/Fig-5]: Independent sample t-test for comparison of pre- and post-test scores between Suryanamaskara and Sheetal Pranayama Groups.

Although, referring to [Table/Fig-3], the mean scores decreased from pretest to post-test, it is important to recognise the distinction between statistical significance and practical significance. Using Huck's (2012) and Cohen's d formula $\{M1-M2 / ((SD1+SD2) / 2)\}$, effect sizes were calculated to quantify the magnitude of change [26]. The results showed a pretest effect size of 0.43, indicating a medium effect and a post-test effect size of 0.32, again indicating a moderate effect size, but with a decrease in effect size over time. Notably, both the Suryanamaskara and Sheetal Pranayama groups demonstrated reduced aggression levels, as evidenced by the decreased effect sizes from pretest to post-test.

DISCUSSION

The findings of this study provide evidence supporting the effectiveness of yogic interventions in reducing aggression levels among college students. Both the Suryanamaskara and Sheetal Pranayama groups exhibited a significant decrease in aggression scores from pre- to postintervention. These results align with earlier research by Godse AS et al., and Stec K et al., highlighting the potential of Suryanamaskara practice in reducing aggression and improving emotional intelligence in college students [27,28]. Additionally, another study by Raja SC found that Suryanamaskara practice reduced symptoms of anxiety and depression, which are often linked to aggression [29]. Since Sheetal Pranayama has also shown equal potential, studies by Jagadeesan T et al., and Rohini P et al., found that Sheetal Pranayama practice improved emotional regulation and reduced aggression among adolescents [30,31].

Furthermore, the present study compared two groups using independent sample t-tests and effect size to determine which intervention was more effective in reducing aggression levels and no significant difference was found. This indicates that both interventions were equally effective in decreasing aggression among college students. Future research is necessary to explore the underlying mechanisms responsible for these group differences. Nevertheless, the present findings offer preliminary evidence supporting the potential of Suryanamaskara and Sheetal Pranayama in managing aggression levels. These results contribute to the growing body of literature suggesting that yoga positively impacts mental health [32,33].

Additionally, the study's pretest post-test design excludes other definitive causal inferences that might have influenced the aggression levels of students. To establish the long-term efficacy of yoga interventions on aggression reduction, randomised controlled trials with extended follow-up periods are required. Consequently, healthcare providers and yoga practitioners may consider incorporating these practices into their interventions for individuals exhibiting elevated aggression.

Limitation(s)

The study was conducted within a specific population of college students. Therefore, generalisability of the findings to other populations may be limited.

CONCLUSION(S)

The present study found that both Suryanamaskara and Sheetal Pranayama were effective in significantly reducing aggression levels among college students after a 10 week yogic intervention programme. While both groups showed improvement, there was no significant difference in the effectiveness of the two different yoga practices. These findings suggest that incorporating yoga into healthcare and wellness programmes could be beneficial for individuals struggling with aggression. Either Suryanamaskara or Sheetal Pranayama can be used as a therapy to reduce aggression, depending on the individual's convenience. However, further research is needed to understand the long-term effects of these practices and to explore how yoga can be integrated into broader mental health interventions.

Further research with larger sample sizes is essential to corroborate these findings and to explore the underlying mechanisms, as well as to determine the optimal duration and intensity of yoga interventions for achieving maximum outcomes for change.

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