

# Effect of Twelve-Week Yoga Intervention on Stress and Anxiety in School Going Children

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## Abstract

**Purpose.** The purpose of the study was to examine the effect of twelve-week yogic practices on stress and anxiety in school going male students.

**Material & Methods.** A total of 30 males, aged (15.5±2.40 years) from senior secondary school were selected as subjects. The subjects were divided into two groups of fifteen each (n=15) randomly. The experimental group underwent yogic practices (asanas & pranayamas) for a period of twelve-week and control group followed a normal routine. The training intervention was for forty-five minutes, six days a week. Stress was assessed by the perceived stress scale and anxiety was assessed by Ducklow's anxiety questionnaire. A pre-post assessment protocol was employed to determine the effect of a twelve-week yogic practice intervention.

**Results.** Unadjusted post hoc comparison between covariate adjusted means revealed a significant difference in anxiety between the experimental,  $M_{adj}=24.7$ ,  $SE_{adj}=0.78$  and control,  $M_{adj}=31.70$ ,  $SE_{adj}=0.78$  groups after twelve-week of yoga intervention,  $p<0.001$ ,  $d=2.35$ , 95% CI [3.36, 1.33]. A significant difference was also observed between experimental,  $M_{adj}=24.5$ ,  $SE_{adj}=0.43$  and control,  $M_{adj}=26.5$ ,  $SE_{adj}=0.43$  groups in stress after treatment,  $p=0.004$ ,  $d=1.15$ , 95% CI [1.97, 0.33].

**Conclusions.** Yogic practices (asanas & pranayamas) are beneficial in reducing the stress and anxiety of school going male students. It may be used as a protocol for the maintenance of sound mental health, wellness and fitness.

**Keywords:** yoga intervention, stress, anxiety, pranayamas, asanas, male students.

## Introduction

Yoga is a physical, mental, and spiritual practice that originated thousands of years ago in ancient India and incorporates physical postures (asanas), breath control (pranayamas), and meditation (dhyana) to promote physical, mental and spiritual health (Büssing et al., 2012). Regular yoga practice has numerous health benefits, including the reduction of stress, anxiety and depression, as well as improved flexibility, cardiovascular health and overall fitness (Shreve et al., 2021). Yoga has been an integral part of Indian culture for millennia in order to reduce stress and enhance physi-

cal health. Several yogic therapies have recently been shown to increase the rate of recovery in depressed patients (Dalpati et al., 2022). Twenty-four yoga interventions were administered over twelve-week to two hundred healthy students in a study that revealed a significant and long-lasting effect on anxiety reduction and sleep quality (Elstad et al., 2020). Yoga and meditation have produced evidences that these practices are effective at reducing stress and anxiety (Bridges & Sharma, 2017). Psychological issues such as anger, depression, anxiety and other stress-related disorders such as insomnia are associated with the lifestyles

of medical professionals and can be mitigated through yogic practices (Sunita et al., 2022). In general, college students who practiced meditative yoga reported lower levels of stress, psychological distress and anxiety (Park et al., 2020). Psychological resource improvements are one of these mechanisms. Yoga may improve mindfulness, body consciousness, self-transcendence, spiritual peace and social connectedness which may mediate its effects on well-being (Park et al., 2020). Yoga and meditation have gained widespread acceptance as non-pharmaceutical modalities for stress and anxiety reduction and general health. Meditation has been shown to enhance focus and self-awareness in a variety of populations, including college students (Lemay et al., 2019). Asanas may improve a patient's flexibility, coordination and strength while meditation and breathing practices may calm and focus the mind to increase awareness and reduce anxiety, improving quality of life (Büssing et al., 2012). However, there is a dearth of research on the effects of yoga interventions particularly on school going children. This study was carried out to assess the effects of twelve-week yoga intervention on school children's stress and anxiety, determining the effectiveness of asanas and pranayamas in lowering stress and anxiety levels in school-aged children. Researchers hypothesised that yogic practices would result in a significant reduction in school children's stress and anxiety. Yoga and meditative practices may provide a skill set to assist school children in their coping mechanisms, both in and out of the classroom.

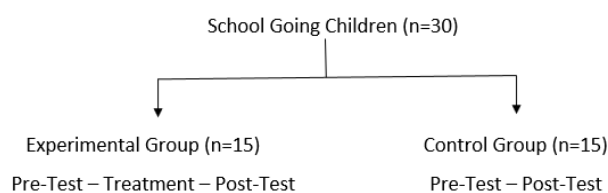
## Material and methods of research

### Subjects

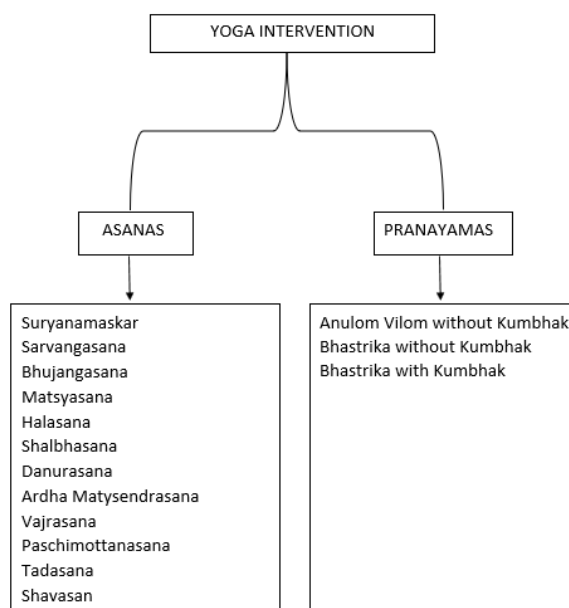
A total of 30 male (age:  $15.5 \pm 2.40$  years, height:  $162 \pm 5.2$  cms, body mass:  $60.1 \pm 6.5$  kgs) school students of Mangolpur Khurd of New Delhi state participated in the study. All the participants were free from any physical condition or illness which might have affected their stress and anxiety levels.

### Ethics and consent

The participants and their parents were informed of the purpose of the study and the confidentiality of the information they provided. Following that, participants signed informed consent forms. The research was authorised by the school principal, the students and the student's parents. The study was conducted in a government boys senior secondary school, Mangolpur Khurd, New Delhi in accordance with the Declaration of Helenski ("World Medical Association Declaration of Helsinki", 2013).



**Figure 1.** Research Design



**Figure 2.** Yoga Intervention Program for School Going Children

### Procedure

This was an interventional study. The pre-intervention Stress and Anxiety were assessed and then asanas and pranayamas programs mentioned in figure 2 were applied. After the completion of twelve-week, stress and anxiety were assessed with the perceived stress scale and Ducklow's anxiety questionnaire. This study was conducted at Government Boys Senior Secondary School, New Delhi, India. The subjects ( $n=30$ ) were equally subdivided into two groups mentioned in figure 1. The control group did not practice asanas and pranayamas in any form. The experimental group was given a treatment of forty-five minutes which included Asanas with cumulative incremental holding time (HT) and repetitions (R), Pranayamas followed by Shavasan, six days a week. Furthermore all the participants continued the practice for a total of twelve-week. The research design employed in the study is mentioned in figure 1. The questionnaire was comprised of two validated, self-reporting inventories: Perceived Stress Scale and Ducklow's Anxiety Questionnaire. The questionnaire utilized a five-point Likert scale ranging from 0 (never) to 4 (very often). The participants frequency for stress-related emotions was recorded. The range of scores from 0 to 13 indicated low stress, 14 to 26 indicated moderate stress, and 27 to 40 indicated high perceived stress. This study utilized the PSS-10, also known as a 10-item inventory (Chan & La Greca, 2020; Lee, 2012). The Ducklow's Anxiety Questionnaire was intended to evaluate excessive anxiety. The responses were compiled using a 5-point Likert scale ranging from 1 (very inaccurate) to 5 (very accurate). The scores between 0 and 17 indicated transitory anxiety, 18 to 27 indicated moderate anxiety, 27 to 36 indicated significant anxiety, and 36 or higher indicated high

anxiety. Before and after the intervention, the two self-reporting questionnaires were distributed to all participants. The questionnaires were available in English, which participants easily understood.

#### Statistical analysis

IBM SPSS version 25.0.0 (IBM, New York, USA) was used to conduct the statistical analyses. Using the Shapiro-Wilk test, the normality of all data was verified. The data are presented as mean  $\pm$  standard deviation (SD). Pre and Post data of experimental and control group for stress and anxiety were analysed by Analysis of Co-variance (ANCOVA). The level of statistical significance was set at 0.05 ( $p \leq 0.05$ ).

## Results

**Table 1.** Unadjusted Mean and Standard Deviation values of Anxiety and Stress for Experimental and Control groups before and after the Twelve-week Yoga Intervention

Groups	Variables	N	Mean	SD
Experimental	Anxiety (pre)	15	32.50	3.44
	Anxiety (post)	15	25.70	5.44
	Stress (pre)	15	26.60	3.50
	Stress (post)	15	24.70	2.74
Control	Anxiety (pre)	15	30.70	3.90
	Anxiety (post)	15	30.70	4.18
	Stress (pre)	15	26.10	2.07
	Stress (post)	15	26.30	2.91

From Table 1, it is evident that in the experimental group, anxiety (pre) was  $32.50 \pm 3.44$  and anxiety (post) after a twelve-week yoga intervention was reported to be  $25.70 \pm 5.44$ . However, in the control group, anxiety (pre) was  $30.70 \pm 3.90$ , and anxiety (post) was observed to be  $30.70 \pm 4.18$ . In the case of stress in the experimental group, stress (pre) was  $26.60 \pm 3.50$  and stress (post) was  $24.70 \pm 2.74$ . Furthermore, in the control group, stress (pre) was  $26.10 \pm 2.07$  and stress (post) was reported to be  $26.30 \pm 2.91$ .

From Table 2, it can be seen that after a twelve-week yoga intervention, experimental and control group differed significantly for stress (post),  $F(1,27)=9.82$ ,  $p=0.004$ ,  $\eta^2=0.11$  and anxiety (post),  $F(1,27)=38.60$ ,  $p<0.001$ ,  $\eta^2=0.34$ . A significant proportion of variance was observed for stress (pre),  $F(1,27)=54.10$ ,  $p<0.001$ ,  $\eta^2=0.59$  and anxiety (pre),  $F(1,27)=47.80$ ,  $p<0.001$ ,  $\eta^2=0.42$ , therefore, inclusion of these variables as a covariate significantly reduced error variance and improved precision.

From Table 3, Post hoc pair wise comparisons of anxiety and stress reveals a significant difference in stress ( $t=6.21$ ,  $p<0.001$ ) as well as anxiety ( $t=6.21$ ,  $p<0.001$ ) between experimental and control group in school going children.

From Table 4 it can be seen that, unadjusted post hoc comparison between covariate adjusted means revealed a significant difference in anxiety between experimental,  $M_{adj}=24.7$ ,  $SE_{adj}=0.78$  and control,  $M_{adj}=31.70$ ,  $SE_{adj}=0.78$  groups after

**Table 2.** ANCOVA Table for Post - treatment Data on Anxiety and Stress

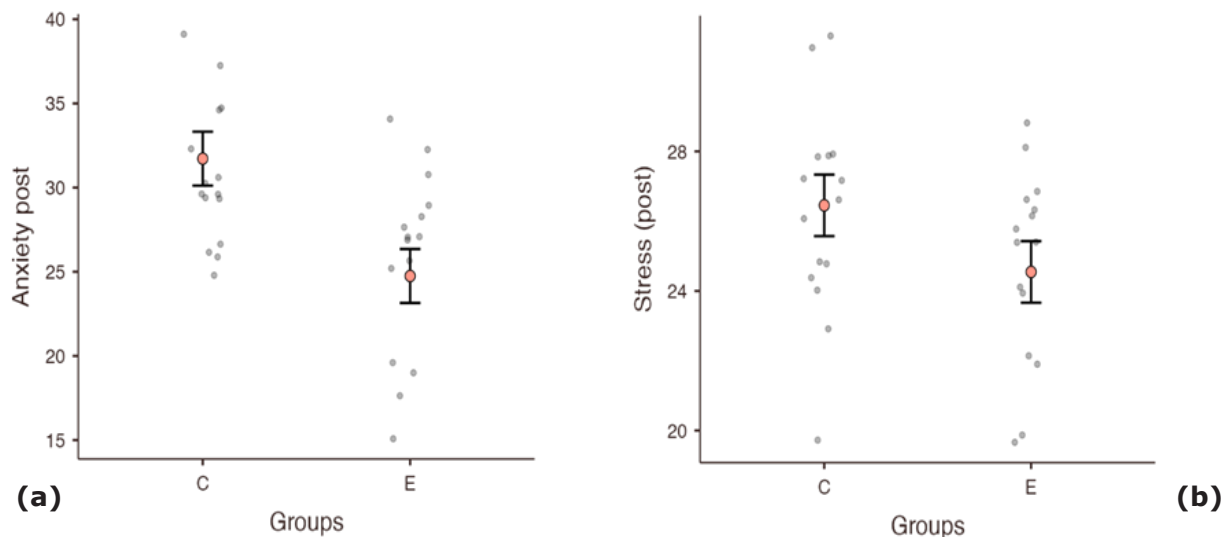
Variables		SS	df	MnSq	F	p	$\eta^2$
Anxiety (post)	Groups	341	1	340.74	38.6	<.001	0.34
	Anxiety (pre)	422	1	421.67	47.8	<.001	0.42
	Residuals	238	27	8.82			
Stress (post)	Groups	27.1	1	27.12	9.82	0.004	0.11
	Stress (pre)	149.3	1	149.34	54.10	<.001	0.59
	Residuals	74.5	27	2.76			

**Table 3.** Post Hoc Pair - Wise Comparisons of Anxiety and Stress

Variables	Comparison	95% Confidence Interval					
		MD	SE	t	p	Lower	Upper
Anxiety	Experimental - Control	6.97	1.12	6.21	<.001	1.33	3.36
Stress	Experimental - Control	1.91	0.61	3.13	0.004	0.33	1.97

**Table 4.** Adjusted Mean and Standard Error of Experimental and Control groups for Anxiety and Stress post treatment

Variables	Comparison	95% Confidence Interval			
		Groups	Mean	SE	Lower
Anxiety	Experimental	24.7	0.78	23.1	26.3
	Control	31.7	0.78	30.1	33.3
Stress	Experimental	24.5	0.43	23.7	25.4
	Control	26.5	0.43	25.6	27.3



**Figure 3.** Differences for Anxiety and Stress in experimental (E) and control group (C) in adjusted means and confidence intervals.

Note: Error bars represents 95% confidence intervals.

twelve-week of yoga intervention,  $p < 0.001$ ,  $d = 2.35$ , 95% CI [3.36, 1.33]. A significant difference was also observed between experimental,  $M_{adj} = 24.5$ ,  $SE_{adj} = 0.43$  and control,  $M_{adj} = 26.5$ ,  $SE_{adj} = 0.43$  groups in stress after treatment,  $p = 0.004$ ,  $d = 1.15$ , 95% CI [1.97, 0.33].

From figure 3 (a) it is evident that anxiety post twelve-week intervention was significant change in mean scores of anxiety. It can be seen from figure 3 (b) that the mean score of stress after intervention in the experimental group declined significantly. However, no change was evident in the case of the control group.

## Discussion

The primary objective of the study was to assess the effect of twelve-week yoga intervention on school children's stress and anxiety. The main findings of the study revealed that twelve-week yoga intervention significantly reduced the stress and anxiety of school going children. In this study, we included school-aged children who appeared to be in good health (physically). After practicing asanas and pranayamas, their anxiety and stress levels decreased. Sunita et al., (2022) also conducted a similar study and mentioned that yogic programmes are beneficial not only for children but also for healthy individuals. Asanas and pranayamas have the potential to reduce stress and anxiety. Yoga can alleviate stress and result in a sense of happiness and pleasure. Woodyard, (2011) did similar research and concluded that regular yoga practice enhances not only mental health, but also the heart rate, respiration rate, and blood pressure. A similar study conducted by Lemay et al., (2019) revealed that twelve-week yoga intervention with forty-five minutes meditation sessions can reduce stress and anxiety levels among college students. A study has also highlighted the importance of short term yoga intervention for reduction of

stress and promotion of well-being among Indian undergraduate medical students (Yadav, Kothari, Bokariya, S Gupta, & C.Harinath). Andermo et al., (2020) concluded that school-based treatments that encourage physical activity can help kids and teenagers feel better mentally and reduce anxiety while boosting resilience and well-being. Khunti et al., (2023) emphasised the benefits of yoga-based classroom interventions for kids mental health. Arora & Bhattacharjee, (2008) reported that an eight-week mindfulness-based stress reduction programme effectively reduced the symptoms of stress and enhanced the general quality of life in cancer patients. Bridges & Sharma, (2017) found that yoga was useful in lowering pregnant women's symptoms of depression. Cocchiara et al., (2019) concluded that yoga is useful in managing and preventing psychological and physical problems. Participants who practice yoga and mind-body meditation frequently report lower stress levels and burn-out in addition to improvements in physical issues and sleep quality. Jindani et al. (2015) compared and determined that the yoga group showed significantly higher improvements in scores for post-traumatic stress disorder, sleeplessness, perceived stress, positive and negative affect, resilience, stress, and anxiety than control group. Laxman, (2022) discovered that the children's attitudes and behaviours were positively impacted by the yoga program. Shankarapillai et al., (2012) reported that dentistry student's state trait anxiety level was significantly reduced by yoga breathing. Brown & Gerbarg, (2005) reported that yoga practices improved mental clarity, focus, mood, well-being, and stress tolerance. A study reported by Burgstahler & Stenson, (2020) suggested that daily mindfulness meditation for five to twelve minutes is linked to reduced stress and anxiety as well as increased mindfulness with more significant effects shown after longer sessions. D'souza et al., (2021)



suggested that adolescent psychosocial stress was effectively decreased by yoga nidra. Shreve et al., (2021) when yoga is practiced for just 10 minutes a day for eight weeks, it can significantly reduce anxiety in children ages 8 to 10 years. Smith et al., (2007) reported that when it comes to lowering stress and anxiety and enhancing health on seven SF-36 domains, yoga was proven to be just as beneficial as relaxation. A systematic review by Weaver & Darragh, (2015) suggested that the yogic intervention decreased anxiousness. In the current investigation, researchers determined that the intervention of twelve-week yoga practices in school going children was helpful in reducing stress and anxiety and these findings are in line with the available scientific evidences pertinent to effect of yogic intervention on mental health, stress, and anxiety reported by the researchers in reputed journals. Nevertheless, the present study has several limitations too, in the current investigation, the effect of asanas and pranayamas was not studied separately and the study included only school going male students as subjects. So, the authors recommends future studies in this area to study the individual effect of different asanas and pranayamas's on the female population of school students, college students, and employees of different sectors. The present study also recommends a sustained yoga program for different time duration to assess the treatment effect on stress and anxiety.

## Conclusion

In conclusion, asanas and pranayamas for a period of twelve-week significantly reduced stress and anxiety of male school students. These findings

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may be beneficial for school going students to cope with stress and anxiety in a new academic environment and to boost mental wellbeing. However, a period more than twelve-week of yoga practice may help further reduction of stress and anxiety. Hence, the asanas and pranayamas program may be continued for reducing stress and anxiety of the school children.

## Author's contribution

Conceptualization, P.P. and T.N.P.; methodology, P.P.; software, P.P.; check, P.P., and T.N.P.; formal analysis, P.P., and T.N.P.; investigation, P.P., and T.N.P.; resources, P.P.; data curation, P.P.; writing – rough preparation, P.P.; writing – review and editing, P.P., and T.N.P.; visualization, P.P., and T.N.P.; supervision, P.P., and T.N.P.; project administration, P.P.; receiving funding, P.P. and T.N.P. All authors have read and agreed with the published version of the manuscript.

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## Conflicts of Interest

The authors declare no conflicts of interest.

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