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Effectiveness of Exercise Program on Stress and Anxiety among School Students

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ABSTRACT
Background: Physical activity promotes bone health, supports healthy muscle growth and development, and improves motor and cognitive development in children and adolescents. The present study was conducted to assess the effectiveness of exercise programs on stress and anxiety among school children and to identify the relationship between stress and anxiety. Methodology: A total of 30 students (ages 13-15 years) in classes VII-IX were selected using a non-probability purposive sampling technique. A quantitative research method with a pretest-posttest design was used to evaluate the effectiveness of the exercise program on the study variables. Students were assessed for stress and anxiety levels using a structured questionnaire, the Perceived Stress Scale (PSS), and the Generalized Anxiety Disorder Scale (GAD-7). Results: Prior to the intervention, 87% of students showed a moderate level of stress and 13% had a high level of stress. After the exercise program, 90% had a low level of stress, and only 10% had a moderate level. Before the intervention, 63% had mild to severe anxiety, while in the posttest, 67% had minimal anxiety and the remaining 33% had a mild level of anxiety. Conclusion: The findings demonstrated that the exercise program was effective in reducing stress (from moderate to low) and anxiety (from mild to minimal) among school students. There was a positive correlation between stress and anxiety in school students.

Keywords: Anxiety, effectiveness, exercise program, school students, stress

INTRODUCTION
Mental and psychological disorders are serious health problems worldwide .[1] Major reasons for mental health issues in children include stress, anxiety, depression, distress, decreased attention span, and obesity, resulting for sedentary behavior, increased screen time, and academic pressure [2]. Stress due to education reduces students' learning capacity, academic performance, sleep quality, physical health and mental well-being leading to increased substance use [3]. Increased anxiety among high school students can affect school performance, relationships, and family life. The estimated prevalence of stress among the school children in South India is 15.8 % - 30.3%, anxiety at 21%-47.3% and depression at 5% - 56.7% [1]
The World Health Organization (WHO) 2024 defines physical activity as "any bodily movement produced by skeletal muscles that require energy expenditure". Physical activity includes movements during leisure time, for commute, or as part of a occupation or domestic activities. Common physical activities are walking, cycling, wheeling, sports, active recreation, and playing. These activities can have beneficial effects on the body, mind, and spirit by reducing stress, improving concentration, and enhancing academic performance [4]. Schools provide an ideal environment for fostering physical development, as they occupy a significant portion of a child's daily routine [2] and adolescents between 6 -17 years need ≥60 minutes of moderate-to-vigorous physical activity each day. However, it was reported in CDC 2024 that around 31% of adults and 80% of adolescents do not meet the recommended levels of physical activity. Center for disease control and prevention (2024). Additionally, another study conducted on Indian children aged 5 to 17 years reported that, they do not achieve recommended levels of physical activity and spend most of their day in sedentary pursuits [5] Evidence highlight that the children and adolescents are prone to stress, anxiety, and depression during school life [5].Although the exercise programs are effective in reducing the stress and anxiety, there is limited knowledge regarding the effect of exercise programs on stress and anxiety in school settings. Thus, the present study was undertaken to assess the effectiveness of exercise programs on stress and anxiety and to identify the relationship between the stress and anxiety of school students

METHODOLOGY
Study design and population
A quasi-experimental study was conducted from March 16 2025 to March 29, 2025 at St. Xavier's High School, Nashik on 30 students from classes VII-IX (aged 12 -15 years). The study included students above 12 years of

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age who provided written consent to participate in the study and underwent the exercise program. Students who were on leave or in examination were excluded from the study.

Study assessments

A structured questionnaire was used to assess the level of stress and anxiety among school students. It consisted of three sections: Section A included socio demographic data such as age, gender, class/education; Section B included the Perceived Stress Scale (PSS) which consisted of 10 items that measured stress; and Section C included the Generalized Anxiety Disorder Scale (GAD – 7) which consisted of 7 items used to assess the anxiety of students. The PSS scale is a 5-point scale: 0 – never, 1 - almost never, 2 – sometimes, 3 - fairly often, 4 - very often. Overall, the PSS scores range from 0-40, with 0-13 indicating low stress levels, 14-26 indicating moderate stress, and 27-40 showing high perceived stress. The GAD-7 scale is a 4-point scale: 0 - not at all, 1 - several days, 2 - more than half the days, 3 - nearly every day. The scores by GAD-7 evaluation range from 0-21, with 0-14 indicating minimal anxiety, 5-9 indicative of mild anxiety, 10-14 indicating moderate anxiety, and 15-21 indicating severe anxiety.

Intervention

The intervention was an exercise program which designed to improve mental health and reduce stress or anxiety in students. It consisted of flexibility exercises, stretching exercises, range of motion exercises, balance training, jogging, running, and outdoor games. The exercise program was implemented in groups, for 60 minutes every day for two weeks. Additionally, effective education and guidance was given to the students on the importance of exercise and being physically healthy for overall well-being.

Data collection

Data for assessments were physically collected prior to the exercise intervention and two weeks post intervention using the structured questionnaire. The participants responded voluntarily and completed the assessment in 10 – 15 minutes.

Statistical analysis

The collected data was organized, tabulated, and analyzed based on objectives and hypotheses of study. The Microsoft Excel Worksheet was used for data analysis, where descriptive variable were reported using frequency, percentage, mean, and standard deviation, while inferential statistics was performed using t- test. Statistical significance was set at $p \leq 0.05$.

RESULTS

Baseline characteristics

Table 1. Socio-demographic data of students

Socio demographic data (N=30)	Frequency	Percent
Age in years		
12	01	03%
13	05	17%
14	20	67%
15	04	13%
Gender		
Boys	21	70%
Girls	09	30%
Class		
VII Standard	02	07%
VIII Standard	02	07%
IX Standard	26	86%

The mean age of the students was 13.5 years with majority (67%) being of 14 years, of whom 70% were boys. Students mostly (86%) studied in IX Standard (Table 1).

Stress and anxiety assessments

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Table 2. Pre and post intervention levels of stress and anxiety

Aspects	Pre-test		Post-test	
	Frequency	Percent (%)	Frequency	Percent (%)
Stress				
Low level	--	--	27	90%
Moderate level	26	87%	03	10%
High level	04	13%	--	--
Anxiety				
Minimal level	11	37%	20	67%
Mild level	12	40%	10	33%
Moderate level	06	20%	--	--
Severe level	01	03%	--	--

The overall mean (SD) score for stress was 21.9 (3.66) indicating that students had 'moderate level of stress'. In the assessments prior to intervention, 87% of students showed moderate level of stress and 13% had high level of stress. Notably, after the exercise program 90% of them had low level of stress and only 10% had moderate stress level (Table 2).

Table 3. Pre and post intervention scores

Variable	Maximum score	Pre-test		Post-test		t-value (df=29)
		Mean	SD	Mean	SD	
Stress	40	21.9	3.66	10.4	2.42	8.21*
Anxiety	21	6.23	2.38	3.31	1.86	4.73*

* Statistically significant data at $p \leq 0.05$

The mean (SD) score for anxiety was 6.2 (2.38) which indicated students had 'mild level of anxiety' (Table 2). Approximately 63% had mild to severe level of anxiety prior to intervention, while post-test 67% had minimal anxiety and remaining 33% had mild level of anxiety. The mean scores for stress and anxiety post intervention was significantly lower than the pre-test scores ($p \leq 0.05$, Table 3).

Correlation between stress and anxiety in school students

Pearson coefficient of correlation test revealed that there was a positive correlation between stress and anxiety of school students, with 'r' value of +0.73, $p \leq 0.05$.

DISCUSSION

Ongoing stress relating to education has demonstrated negative impact on students' learning capacity, academic performance, education and employment attainment, sleep quality and quantity, physical health, mental health and substance use outcomes.[6] Hence managing stress in students becomes essential to improve their attention and day-to-day activities. Our study demonstrated that exercise helps to reduce stress and anxiety in school students.

In pretest, the overall mean scores indicated that students had moderate level of stress and mild level of anxiety in post-test, the overall mean scores decreased significantly. These findings demonstrated that exercise program was effective in reducing the level of stress (from moderate level to low level) and anxiety (from mild level to minimal) in school students significantly. Similar to this, a previous study conducted on students aged between 11 and 19 years showed that exercise effectively reduces stress, depression and anxiety scores in children and adolescents (CDC 2024). Another systematic review conducted on 30,000 participants aged ≤20 years from 14 countries, found that physical inactivity is associated with poorer psychological and mental health conditions in students [7]. Structured interventions, such as yoga and supervised physical exercise programs, have been shown to lower stress levels and anxiety levels, and enhance mental health. Further it was recommended that the schools should consider integrating tailored exercise programs into the curriculum to address the psychological well-being of students.[8]

In our study, the majority of students had moderate level of stress and a few had high level of stress which decreased considerably after undertaking the exercise program. Furthermore, anxiety also reduced significantly after the exercise program. Similar results were demonstrated from the study conducted on total of 300 high school students, aged 14-17 years, and the findings were 85% of participants had moderate stress pre-program; post-8-week aerobic intervention, 88% reported low stress and 12% mild anxiety.[9] Another study found that both aerobic exercise and music therapy are effective in reducing stress and anxiety among high school level boarding students[10]

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There was a positive correlation between stress and anxiety in school students participating in our study. A similar finding was observed in a study that showed anxiety and stress in adolescents have significant associations with familial and lifestyle factors. After multivariate analysis, anxiety was found to have significant associations with father's education, father's occupation, history of mental illness in subject, family history of somatic illness, open discussion of thoughts and worries with family, recent stressful events, exercise, substance abuse in parents and poor sleep. Stress showed significant associations with gender, family history of mental illness, open discussion of thoughts and worries with family, recent stressful events and poor sleep quality [11]. Identifying these risk factors can enable timely diagnosis and intervention.
Overall, it is evident from our study that the exercise program is effective in reducing the severity of stress and anxiety among school students. It further showed that stress and anxiety were highly correlated in school students.

STRENGTHS AND LIMITATIONS

The study addresses a significant and timely issue of stress and anxiety among school children which is increasingly recognized as a public health concern in adolescent mental health. The strength of the study includes the use a non- pharmacological, low -cost and easily implementable intervention with a focus on adolescent population which is a critical development stage. However, the sample size was used are students of class VII-IX of one school only, hence the results obtained cannot be extrapolated to other schools of this area.

FUTURE DIRECTIONS

Future studies need to be conducted with larger number of students having varied age groups and varied locations including rural and tribal regions. Further, the effect of including aerobic exercises and increasing the duration of exercises can be evaluated. Additionally, effect of exercise on depression, emotional problems and attention deficit hyperactivity disorders (ADHD) can be evaluated. Longitudinal studies analyzing the effect of exercise programs on mental health and academics of students are needed.

CONCLUSION

Physical and mental health is an asset and must be preserved in children. Stress and anxiety are the notable mental health problems of school students and adolescents. The findings of this study demonstrated that the one week of exercise program was effective in reducing the severity level of stress and anxiety symptoms of school students at school settings. It was noted that there was a positive correlation was found between stress and anxiety of students. It is recommended that the school-based physical exercise program or activity shall be implemented regularly to improve the well-being and mental health of students.

Ethical approval

The study was conducted after obtaining ethical clearance from the Institutional Ethics Committee of the College of Nursing. Written informed consent was obtained from the school authorities, parents, and from participating students prior to data collection. The study adhered to the ethical principles of confidentiality, voluntary participation, and the right to withdraw without any penalty.

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Author contributions

The author MLF designed the study, and SLF collected data, performed data analysis and prepare the first draft of the manuscript. They also contributed for the interpretation of results, critical review of the manuscript for intellectual content and provided guidance in finalizing the paper.

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Conflict of interest

The authors declared no conflict of interest.

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