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Original Research Paper

Physiology

COMPARATIVE STUDY OF THE EFFECT OF YOGA AND AEROBIC EXERCISE ON MENTAL WELL-BEING OF MEDICAL STUDENTS

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ABSTRACT

Introduction: Medical education is a demanding and full-time commitment, involving academic tasks, social conduct, and patient care. Stress and pressure can lead to burnout, anxiety, and depression, impacting academic performance and patient care. Studies show a high prevalence of depression and anxiety symptoms among medical students. Exercise and aerobic exercise can improve mental health, potentially preventing mental diseases. **Methods:** The study, conducted in the Physiology department and all MBBS 1st Year students satisfying inclusion criteria and STAI score ≥38 was included. Students were divided into Two groups, interventions of Aerobic exercise and Yoga were implemented. At the end of 12 weeks, the students were administered with STAI questionnaire for Anxiety and Ryff's Psychological Well Being Scales (PWB) for mental wellbeing. For comparison of categorial variables between groups, chi square test will be applied. For comparison of continuous variables between groups, student T test will be applied. P value <0.05 will be considered as statistically significant. **RESULTS:** Among final study participants, 71(47.3%) were in Aerobic Exercise Group and 79(52.7%) were in Yoga Group. There was a statistically significant difference between Pre intervention Ryff's PWB score and Post intervention Ryff's PWB score among both Yoga Group and Aerobic exercise group. There was no statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Age, Gender, Residence. There was no statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Post intervention state-trait-anxiety inventory (STAI) score. There was a statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Post intervention Ryff's PWB score. **CONCLUSION:** Both Aerobic Exercise and Yoga resulted in significant decrease in Anxiety and improved mental wellbeing of medical students. In terms of post-intervention state-trait-anxiety inventory (STAI) score, there was no statistically significant difference between the Aerobic Exercise Group and the Yoga Group. post-intervention Ryff's PWB score was better in Yoga Group than Aerobic Exercise Group. Yoga resulted in better improvement in mental wellbeing of students than Aerobic exercise.

KEYWORDS : Yoga, Aerobic Exercise, Anxiety, Mental well-being, Ryff's PWB score, STAI score.

INTRODUCTION

Medical education, a full-time commitment involving academic tasks, social conduct, support, and patient care, can lead to significant stress and pressure for medical students, causing burnout, anxiety, and depression. This can negatively impact academic performance and future patient care, with a growing literature on depression and anxiety symptoms among medical students.[1]

Aerobic exercise has been proven to boost confidence, self-concept, and cognitive abilities, potentially preventing mental diseases. It temporarily enhances brain blood flow, releases feel-good endorphins, and boosts neurotransmitter production of norepinephrine and adrenaline. Physical activity, whether aerobic or anaerobic, increases sympathetic tone and physiological arousal, causing a rapid mental shift in physically fit individuals after a strenuous workout.[2,3]

Yoga, an ancient Indian technique, significantly improves mental health by promoting balance and health in physical, psychological, emotional, and spiritual dimensions. It aids in treating psychological disorders like stress and anxiety by establishing a spiritual connection between mind and body, making it an effective intervention for medical students.[4,5]

The COVID-19 pandemic has significantly impacted the mental well-being of medical students and people of all ages and walks of life, with various pranayama (body postures) contributing to these effects.

Medical education requires practical experience and skill development, which virtual courses cannot meet. The pandemic has significantly impacted students' mental health, with solitary confinement for over two years compromising their mental well-being. Regular physical exercise, such as aerobic activities like running, swimming, or aerobic dance, can help alleviate stress. However, there are few studies on the impact of yoga and aerobic exercise on mental well-being among Indian students.[6] Hence the study aims to compare the effect of yoga and aerobic exercises on the mental well-being of medical students.

Objectives

- To study the pre and post interventional effect of aerobic exercise on mental wellbeing and anxiety in medical students.
- To study the pre and post interventional effect of Yoga on mental wellbeing and anxiety in medical students.
- To compare the effectiveness of yoga and aerobic exercise on anxiety levels and mental well-being of medical students.

MATERIALS AND METHODS

Study Design: The present study was an Open label double armed randomised trial done in Department of Physiology of tertiary care centre.

Study Setting: The present study was done in Department of Physiology of Moti Lal Nehru Medical College.

Study Time Line: The study was conducted from April 2023 to March 2024.

Sampling Unit: MBBS 1st year students

Sample Size: In our present study we included all 200 MBBS 1st Year students of Moti Lal Nehru Medical College.

Sampling Method: Students were selected into two interventional groups by Simple Random Sampling with Lottery Method. The present study is open labelled study as the study participants as well as investigators were aware of the interventions to both aerobic exercise and yoga group they belong.

Inclusion Criteria

- MBBS 1st Year students who were willing to give consent

Exclusion Criteria

- Students who had physical limitations due physical deformity.
- Students who did not have any contradictions to ESSA scale
- Students who have any physical or mental illness before joining of MBBS.
- Students who were on medications for psychological illness.

Methodology

A class of 200 medical students participated in the study. During their first term, trait anxiety and learning approaches was assessed by use of the state-trait-anxiety inventory (STAI).[7]

Based on the scores the students were categorized into

- High trait anxious (HTA) with STAI score > 45
- Middle trait anxious (MTA) with STAI score > 38
- Low trait anxious (LTA) with STAI score < 37.

Among 200 students who were assessed with STAI score, 160 study participants belonged to Middle and High trait STAI Score. Students belonging to HTA and MTA score was randomly divided into yoga group and aerobic group. 80 study participants were included into each group. Yoga and aerobic exercise were done at a frequency of 3 days per week for 12 weeks. Among LTA students, neither yoga or aerobic exercise was done. Students who satisfied the inclusion criteria and had no contradictions to exercise as per the Exercise & Sports Science Australia (ESSA) Pre-exercise Screening tool were included in yoga and aerobic exercise group. ESSA was Screening tool for assessment of any risk factors associated with the participation of physical exercise.[8] Students were screened for mental wellness using Ryff's Psychological Well Being Scales (PWB) - 42 item version at the time of recruitment.[9] At end of 12 weeks of time of 2nd terminal exam STAI questionnaire and Ryff's Psychological Well Being Scales - 42 item version was again administered to observe the effectiveness of yoga and aerobic exercises on anxiety and mental well-being.

Final Study Participants Included in the Study

At the end of study in Exercise group among 80 students, only 71 students completed the aerobic exercise for 12 week. So, we included those 71 students in our study. At the end of study in Yoga group among 80 students, only 79 students completed the Yoga for 12 week. So, we included those 79 students in our study.

Statistical Analysis

Data collected will be entered in Excel 2019, and analysis of data will be done using Statistical Package for Social Sciences for Windows, Version 22. The data on categorical variables will be shown as n (% of cases), and the data on continuous variables were presented as mean, and standard deviation (SD). For comparison of categorial variables between groups, chi square test will be applied. For comparison of continuous variables between groups, student T test will be applied. P value <0.05 will be considered as statistically significant.

RESULTS AND OBSERVATIONS

Among final study participants, 71(47.3%) were in Aerobic Exercise Group and 79(52.7%) were in Yoga Group. The mean age of students among Aerobic Exercise Group was 18.80±0.91 years. The mean age of students among Yoga Group was 18.82±0.87 years. The mean age among Total study participants combined was 18.81±0.89 years. 62(41.3%) were males and 88(58.7%) were females. 97(64.7%) belonged to Urban area and 53(35.3%) belonged to Rural area. According to state-trait-anxiety inventory (STAI) score at the start of study, 46(30.7%) were Middle trait anxious (MTA) and 104(69.3%) were High trait anxious (HTA).

The mean Pre intervention state-trait-anxiety inventory (STAI) score among Aerobic Exercise Group, was 47.62 with a SD of 5.07 and the mean Post intervention state-trait-anxiety inventory (STAI) score was 44.08 with a SD of 4.04. The mean Pre intervention state-trait-anxiety inventory (STAI) score among Yoga Group was 48.82 with a SD of 5.36 and the mean Post intervention state-trait-anxiety inventory (STAI) score was 44.27 with a SD of 4.73.

The mean Pre intervention Ryff's PWB score among Aerobic Exercise Group was 175.83 with a SD of 22.45 and the mean Post intervention Ryff's PWB score was 188.93 with a SD of 20.26. The mean Pre intervention Ryff's PWB score among Yoga Group was 181.20 with a SD of 22.16 and the mean Post intervention Ryff's PWB score was 207.26 with a SD of 16.32.

The mean Post intervention state-trait-anxiety inventory (STAI) score among Aerobic Exercise Group was 44.08 with a SD of 4.04 and the mean Post intervention state-trait-anxiety inventory (STAI) score among Yoga Group was 44.27 with a SD of 4.73.The mean Post intervention Ryff's PWB score among Aerobic Exercise Group was 188.93 with a SD of 20.26. The mean Post intervention Ryff's PWB score among Yoga Group was 207.26 with a SD of 16.32.

There was a statistically significant difference between Pre intervention Ryff's PWB score and Post intervention Ryff's PWB score among both Yoga Group and Aerobic exercise group.

There was a statistically significant difference between Pre intervention state-trait anxiety inventory (STAI) score and Post intervention state-trait-anxiety inventory (STAI) score among Aerobic Exercise Group and Yoga group.

There was no statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Post intervention state-trait-anxiety inventory (STAI) score. There was a statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Post intervention Ryff's PWB score.

Table 1: Distribution According To Sociodemographic Profile

Age (Years)	Mean	SD
Mean Age among Aerobic Exercise Group	18.80	0.91
Mean Age among Yoga Group	18.82	0.87
Mean age among Total participants	18.81	0.89
Gender	Frequency	Percentage
Male	62	41.3
Female	88	58.7
Residence	Frequency	Percentage
Urban	97	64.7
Rural	53	35.3

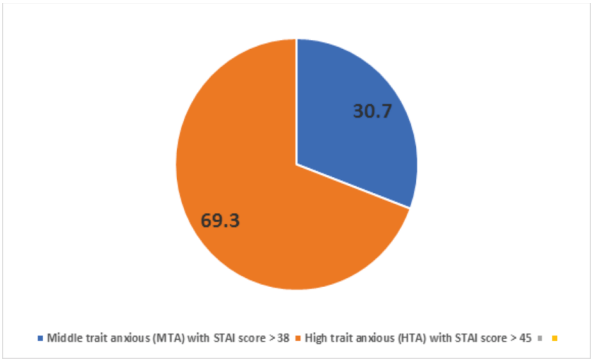

Figure 1: Distribution According To State-trait-anxiety Inventory (STAI) Score

Table 2: Comparison Of Pre Intervention And Post Intervention STAI Score Among Aerobic Exercise Group

STAI score	Pre intervention score	Post intervention score	P value
Mean	47.62	44.08	0.0001
SD	5.07	4.04	

Paired T test applied, P value is statistically significant

Table 3: Comparison Of Pre Intervention And Post Intervention STAI Score Among Yoga Group

STAI score	Pre intervention score	Post intervention score	P value
Mean	48.82	44.27	0.0001
SD	5.36	4.73	

Paired T test applied, P value is statistically significant

Table 4: Comparison Of Pre Intervention And Post Intervention Ryff's PWB Score Among Aerobic Exercise Group

Ryff's PWB score	Pre intervention score	Post intervention score	P value
Mean	175.83	188.93	0.0001
SD	22.45	20.26	

Paired T test applied, P value is statistically significant

Table 5: Comparison Of Pre Intervention And Post Intervention Ryff's PWB Score Among Yoga Group

Ryff's PWB score	Pre intervention score	Post intervention score	P value
Mean	181.20	207.26	0.0001
SD	22.16	16.32	

Paired T test applied, P value is statistically significant.

Table 6: Comparison Of Aerobic Exercise Group And Yoga Group In Regards To Post Intervention STAI Score

Post intervention STAI Score	Aerobic Exercise Group	Yoga Group	P value
Mean	44.08	44.27	0.789
SD	4.04	4.73	

Independent Student T test applied, P value is not statistically significant

Table 7: Comparison Of Aerobic Exercise Group And Yoga Group In Regards To Post Intervention Ryff's PWB Score

Post intervention Ryff's PWB score	Aerobic Exercise Group	Yoga Group	P value
Mean	188.93	207.26	0.0001
SD	20.26	16.32	

Independent Student T test applied, P value is statistically significant

DISCUSSION

Despite the literature on effects of Yoga and Aerobic Exercise on the anxiety and wellbeing is limited, the present study was carried to find the effectiveness of yoga and Aerobic Exercise on anxiety levels and mental well-being of medical students in the department of physiology of Tertiary care hospital. Comparing which modality is superior for alleviating anxiety and provide mental welling being, in our present study students were divided in two groups with one group undergoing intervention of Yoga and another with Aerobic Exercise.

In a study done by Winroth D et al (2019)[10], No significant changes in scores on the State-Trait Anxiety Inventory (STAI) were seen after the aerobic activity. when compared mean intervention state-trait-anxiety, pre and post intervention, there was a statistically significant difference between Pre intervention state-trait-anxiety inventory (STAI) score and Post intervention state-trait-anxiety inventory (STAI) score among Yoga Group. In a study conducted by Pandey SK et al (2017)[11], mean Pre intervention anxiety score among Yoga group was 46.22 with a SD of 3.17 and mean Post intervention anxiety score was 22.65 with a SD of 5.18. there was a statistically significant difference between Pre intervention anxiety score and Post intervention state anxiety score among Yoga Group. (p value <0.0001). in a study done by Brown RP et al (2005)[12], Sudarshan Kriya yoga, a set of breathing practices including ujjayi, bhastrika, and Sudarshan Kriya, can effectively reduce anxiety, depression, stress, and stress-related medical conditions. Calm alertness is achieved through heightened parasympathetic activity, suppression of stress response systems, neuroendocrine hormone release, and activation of thalamic generators. In a study done by Dias ET et al (2017)[13], The use of the SKY technique, which involves rigorous breathing training, has been shown to enhance both anxiety and depressive illnesses, as well as increase CAC and cardiorespiratory coupling. These findings indicate that the SKY training might be a beneficial nonpharmacological intervention for enhancing symptoms and lowering cardiovascular risk in people with anxiety/depression disorders.

In our present study, there was a statistically significant difference between Pre intervention Ryff's PWB score and Post intervention Ryff's PWB score among Aerobic Exercise Group. In a study done by Panchal S et al (2020)[14], among young adults to determine the state of Psychological Well-being, level of Aerobic capacity and assess the correlation between Psychological Well-being & Aerobic capacity, found that The Ryff's psychological well-being scale has a positive association of 0.622 with aerobic capacity, as measured by VO2max. Guszkoswska M et al (2004)[15] found that Aerobic exercise has been scientifically shown to alleviate anxiety and depression by enhancing cerebral blood circulation. It impacts the functioning of the hypothalamic-pituitary-adrenal axis, hence indirectly affecting physiological responsiveness to stress. Saadat M et al (2018)[16], found that Aerobic activities have a significant impact on mental well-being, affecting several parts of it. These exercises have been shown to alleviate depression in a considerable proportion of instances.

In our present study, there was significant improvement in score after yoga intervention, it improved psychological well being of medical students. In a study done by Sarovar K et al (2022)[17], the mean Pre intervention Ryff's PWB score among Yoga Group was 158.45 with a SD of 11.66 and the mean Post intervention Ryff's PWB score was 198.15 with a SD of 10.9. there was a statistically significant difference between Pre intervention Ryff's PWB score and Post intervention Ryff's PWB score among Yoga Group (p value <0.001). our study were consistent with study findings of study done by Sarovar K et al (2022)[17].

In a study conducted by Pandey SK et al (2017)[11], The mean

Post intervention anxiety score among Aerobic Exercise Group was 36.37 with a SD of 9.58 and the mean Post intervention anxiety score among Yoga Group was 22.65 with a SD of 5.18. There was a statistically significant difference between Aerobic Exercise Group and Yoga Group in regards to Post intervention state-trait-anxiety inventory (STAI) score (p value <0.0001). in a study done by Pandey SK et al (2017)[11], Yoga was superior in alleviating anxiety than Aerobic exercise group. In a study done by Winroth D et al (2019)[10], There were no discernible disparities in scores on the STAI after the aerobic exercise.

Students who participate in yoga training and physical exercises see a good influence since these activities reduce the negative effects of test stress on psycho-physiological factors. The advantages of practicing yoga are immediately apparent and have a bigger influence on the majority of the variables that were evaluated across the course of the study. A kind of Aerobic Excercise known as yoga has a mild influence on the HPA axis, which results in beneficial benefits and a reduction in autonomic dysregulation brought on by the stress that is experienced during examinations. Physical workouts of moderate intensity, on the other hand, initially excite the HPA axis and the sympathetic nervous system, but these exercises also enhance autonomic tone with prolonged periods of practice.

CONCLUSION

We can conclude that both Aerobic Exercise and Yoga resulted in significant decrease in Anxiety and improved mental wellbeing of medical students. In terms of post-intervention state-trait-anxiety inventory (STAI) score, there was no statistically significant difference between the Aerobic Exercise Group and the Yoga Group. post-intervention Ryff's PWB score was better in Yoga Group than Aerobic Exercise Group. Yoga resulted in better improvement in mental wellbeing of students than Aerobic exercise. Yoga being ancient method and practicing requires minimal to no equipment would be the best intervention for students to prevent Anxiety and promote mental well-being.

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