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EFFECT OF TAI CHI EXERCISES ON ACADEMIC STRESS AMONG ADOLESCENTS IN SELECTED PRE-UNIVERSITY COLLEGE (PUC) AT MANGALURU

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Abstract
Introduction: *Academic stress refers to the mental pressure arising from academic challenges, failures, or the possibility of educational shortcomings. Adolescents face increasing responsibilities, including academics, extracurricular activities, and personal development. This study aimed to assess the effect of Tai Chi exercises in reducing academic stress among adolescents.*
Methods: *A true experimental study was conducted at a selected pre-university college in Mangaluru. The sample comprised 80 adolescents, divided into experimental and control groups. Data were collected using a Demographic Proforma and the Academic Stress Scale.*
Results: *Both groups initially showed moderate levels of academic stress. The mean pre-test academic stress levels were similar in the experimental (98.75±9.96) and control groups (99.90). After Tai Chi exercises, the experimental group exhibited a significant reduction in mean academic stress levels (post-test: 87.58±11.99; p=0.001), while the control group showed no significant change (post-test: 100.75±9.50). The post-test academic stress levels in the experimental group were significantly lower than in the control group (p<0.05). No significant association was found between academic stress and demographic variables.*
Conclusion: *Tai Chi exercises were effective in reducing academic stress among adolescents. The findings emphasize the importance of incorporating complementary therapies like Tai Chi into educational curricula to support adolescent well-being and manage academic stress effectively.*
Keywords: *Adolescents; academic stress; effect; Tai Chi exercises; complementary therapy.*

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I. Introduction

Adolescence marks a critical phase in human growth, both physically and mentally, typically spanning the journey from puberty to adulthood(Wong, H. 2018).Academic issues are considered the most prevalent stress source for college students (Chawla, K., & Sachdeva, V. 2017).Academic pressure arises from various factors, such as the need to prepare for exams and tests, the competitiveness among students at different grade levels, and the desire to acquire a substantial amount of knowledge within a brief time(Yang, C., Chen, A., & Chen, Y. 2021).

Adolescents comprise roughly 17% of the global population. India holds the top position in terms of population of adolescents in the world, with a remarkable 253 million individuals. According to research, 63.5% of Indian students experienced stress as a result of academic pressure(Rantala, S., Nayak, R., Patil, S., Hegde, G., &Aladakatti, R. 2019). Various strategies have been identified to combat stress, including Music therapy, laughter therapy, guided visualization, and relaxation practices such as Tai Chi and yoga.(National Library of Medicine (US). 2023, August 18).

Tai Chi, an ancient Chinese practice known for its slow, deliberate movements, has effectively reduced

student stress levels(Lam, P. 2014).

Tai Chi training is widely acknowledged as a powerful method for diminishing stress and enhancing the overall quality of life this has inspired the researcher to study this topic.

II. Methodology

This study utilised an experimental approach to determine the effects of Tai Chi exercises in reducing academic stress among adolescents in selected Pre- University College (PUC) at Mangaluru.A True experimental pre-test, post-test, and control group design were used for the current study. The current investigation was carried out at Padua Pre-University College at Mangaluru. The sample in the current investigation comprised 80 students selected from the science stream by simple random sampling technique with the lottery method. , forty each in the experimental and control groups. The tools used in this study are the demographic proforma to assess the baseline characteristics and the academic stress scale, which is employed to measure the level of academic stress of adolescents.

Inclusion criteria

- Adolescents.
- Both male and female students between 17-19 years interested in taking part in the research.
- Willing to continue the intervention for 21 days.

Exclusion criteria

- Adolescents who were already exposed to Tai Chi exercise or other relaxation techniques.
- Suffering from physical illness when the data was being collected.
- Unavailable when the data was obtained.
- Adolescents with physical deformities of the lower limb.
- Adolescents taking any treatment for stress.

Approval was obtained from the college, and participants were selected per the criteria. Written consent and assent were secured using WHO forms, ensuring confidentiality. Baseline demographic data and academic stress levels of experimental and control groups were assessed on day one using the Demographic Proforma and Academic Stress Scale. The experimental group received 30-minute Tai Chi sessions and practised for 21 days under supervision, while the control group received no intervention. Academic stress levels were reassessed on the 22nd day using the same scale for both groups. Descriptive statistics and Inferential statistics were used to achieve study objectives.

Ethical Consideration

Ethical approval was obtained from the Institutional Ethics Committee, A J Institute of Medical Sciences and Research Centre (AJEC/17/2023), and the concerned organisation's authority to conduct the study.

III. Results

Distribution of the Samples according to Demographic Characteristics

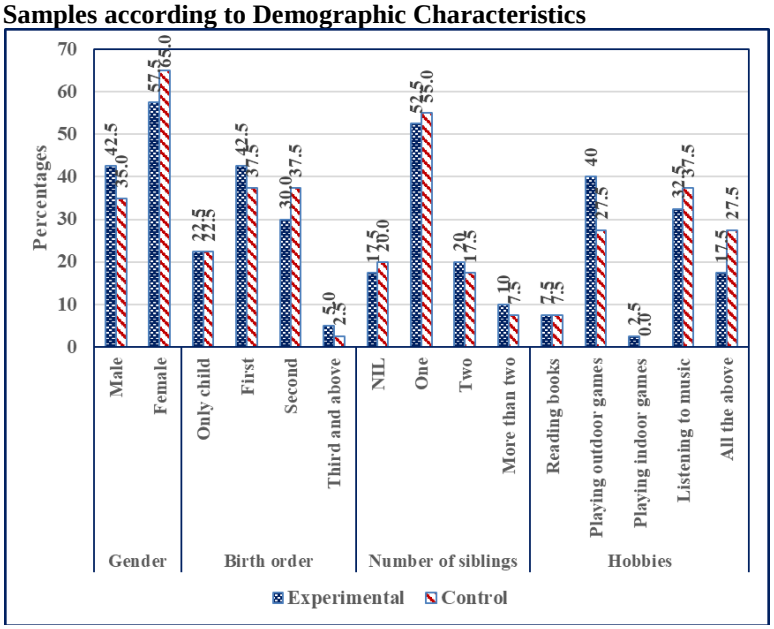

Fig:1 Distribution of the Samples according to Demographic Characteristics

Fig 1.Shows all the subjects were within the range of ages between16-17 years. Gender-wise distribution showed that the majority of the subjects, 57.5% in the experimental group and 65% in the control group, were females, whereas 42.5% in the experimental group and 35% in the control group were males.

In the current investigation, the birth order of the majority of the subjects, 42.5% in the experimental group, were first children, 30% were second children, whereas in the control group, an equal percent, 37.5%, were first children or second children. Only children in both groups were 22.5%. The majority in the experimental group, 52.2%, and the control group, 55%, had only one sibling. Almost equal percentages in the experimental group, 20%, and the control group, 17.5%, had no siblings or more than two siblings. In the experimental group, the highest percentage of subjects, 40%, had a hobby as playing outdoor games, 32.5% had listening to music as their hobby, whereas in the control group, 27.5% had a hobby as playing outdoor games, and 37.5% had listening to music as their hobby. In both groups, about 7.5% had a hobby such as reading books. About 17.5% in the experimental group and 27.5% in the control group had a hobby like all the above, such as playing outdoor or indoor games and listening to music.

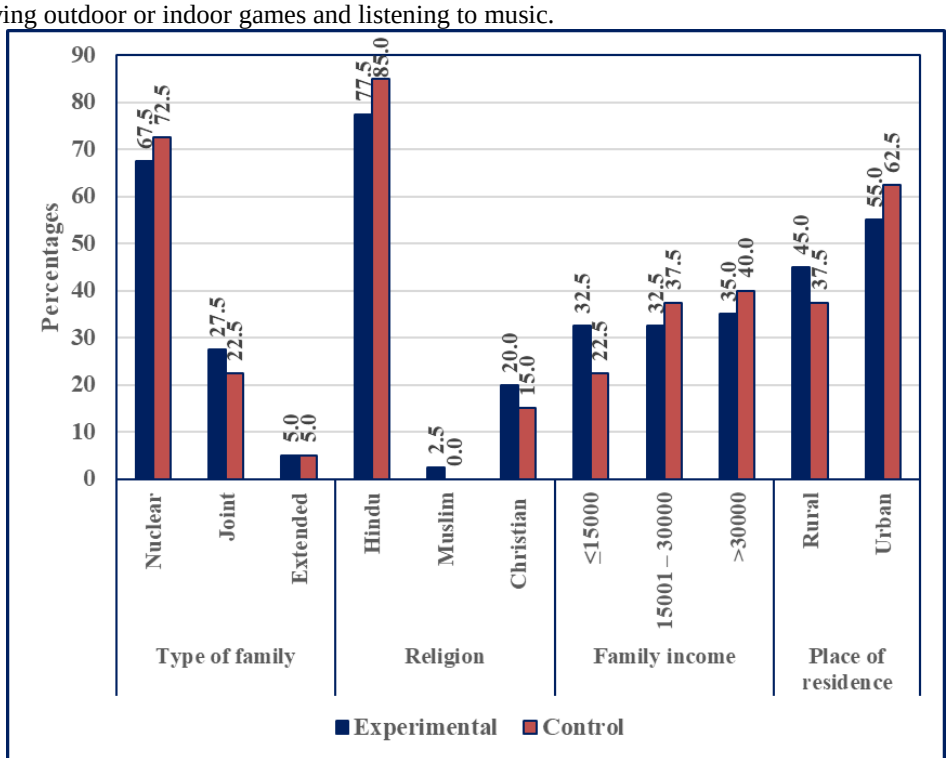

Fig:2 Distribution of the Samples according to Demographic Characteristics

Fig :2 showedthe majority of the subjects belonged to nuclear families, with 67.5% of the subjects in the experimental group and 72.5% of the subjects in the control group. About one-fourth, 27.5%, in the experimental group and 22.5% in the control group came from joint families, and the remaining 5% of subjects belonged to extended families. In the experimental group, 77.5% were Hindus, 20% were Christians, and 2.5% were Muslims. However, in the control group, 85% were Hindus and 15% were Christians. With respect to family income, 35% belonged to family income >30000 group, and 32.5% belonged to the 15001 to 30000. In both groups, 40% belonged to the>30000 group, and 37.5% had family income between 15001 to 30000. In the experimental group, 55% were from urban regions, and 45% were from rural locations, whereas in the control 62.5% were from urban regions and 37.5% were from rural locations.

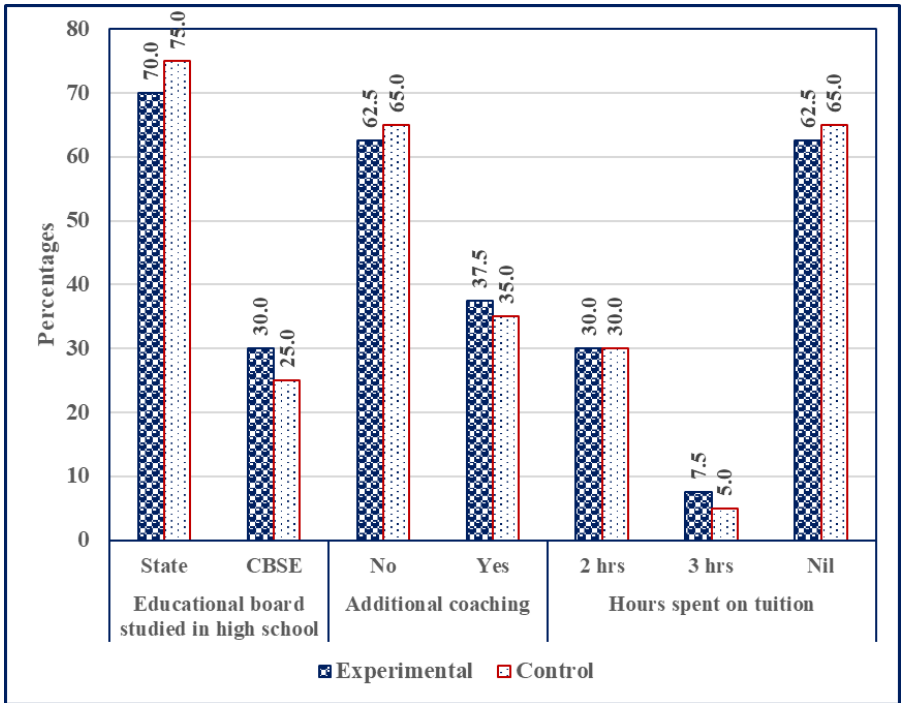

Fig:2 Distribution of the Samples according to Demographic Characteristics

Fig3. It showed that all the subjects were first-year students and belonged to the science stream. The majority of the subjects' medium of instruction in high school in the experimental group, 97.5%, and 95% in the control group was English. 2% in the experimental group and 5% in the control group had Kannada as the medium of instruction in high school. The majority, 70% in the experimental group and 75% in the control groups studied high school in the state syllabus. The remaining subjects in both groups followed the CBSE syllabus. Additional coaching was received by 37.5% of the subjects in the experimental group and 35% in the control group. In the experimental group, 30% spent two hours, 7.5% spent 3 hours on tuition, whereas in the control group, 30% spent 2 hours, and 5% of subjects spent 3 hours on tuition

Table 1: Pre-test and post-test Levels of Academic Stress among Adolescents in Experimental and Control group

n=40+40

Test	Level of stress	Experimental		Control	
		f	%	f	%
Pre-test	Low	0	0	0	0
	Moderate	29	72.5	29	72.5
	High	11	27.5	11	27.5
Post-test	Low	0	0	0	0
	Moderate	38	95.0	28	70.0
	High	2	5.0	12	30.0

Table 1. showed that both the experimental and control groups, the majority of subjects, 72.5%, had moderate levels of academic stress, whereas 27.5% experienced severe levels of academic stress. After the intervention, only 5% of the experimental group experienced high levels of academic stress, while 95% of them experienced moderate levels. On the other hand, 30% of the control group experienced high levels of academic stress, while 70% experienced moderate levels.

Table 3: Homogeneity Comparison of Outcome Variables at Baseline among the Experimental and Control groups

n=40+40

Pre/Post	Group	Mean	SD	t-value	p value
Pre-test	Experimental Group (n=40)	98.75	9.96	0.532^{ns}	0.596
	Control Group (n=40)	99.90	0.37		

Before checking the effect of Tai Chi Exercises on academic stress, academic stress among the

experimental group and control group was compared using independent t-test for testing the homogeneity of the two groups

Table 3. shows that the analysis findings show that the p-value (0.596) was greater than the significant level of 0.05; hence, the test statistic value (0.532) is non-significant. Therefore, it can be concluded that there was no statistically significant difference between the two groups, suggesting that they were homogenous in terms of the level of academic stress before the intervention.

Comparison of both pre-test and post-test levels of academic stress within the experimental and control group

Table 4: Mean, Mean difference, SD, t value, and p-value of pre-test and post- test levels of academic stress within Experimental and Control Group

n=40+40

Academic stress		Mean±SD	Mean difference	t value	p value
Experimental group	Pre-test	98.75±9.96	-11.17	12.08**	<0.001
	Post test	87.58±11.99			
Control group	Pre-test	99.90±9.38	0.850	2.87**	0.007
	Post test	100.75±9.50			

*** Significant at 0.05 level*

Table 4. shows that in the case of the experimental group, the p-value was less than 0.05, so the t-value was significant. This indicated that there exists a significant difference in pre and post-academic stress levels. The mean academic stress level in the pre-test was 98.75±9.96, and that in the posttest was 87.58±11.99. Academic stress levels decreased by -11.17, and the difference was found to be significant, indicating that academic stress significantly reduced after intervention.

In the control group, the p-value was also less than 0.05 indicating a significant difference in academic stress levels between the pre-test and post -test. Comparing the mean, it can be seen that the pre-test mean academic stress level was 99.90±9.98, and the post-test mean academic stress level increased to 100.75±9.50. This significant increase in the mean academic stress level suggest that academic stress level rose significantly.

Comparison of post-test levels of academic stress between experimental and control groups

Table 5: Mean, SD, and "t" values of Post-test Levels of Academic Stress between the Experimental and Control Group

n=40+40

Pre/Post	Group	Mean	SD	t-value	p value
Post-test	Experimental Group (n=40)	87.58	11.99	5.447**	<0.001
	Control Group (n=40)	100.75	9.50		

*** Significant at 0.05 level*

In table 5. the mean post-test academic stress level of the experimental group (87.58±11.99) was significantly lower than the mean post- test academic stress level of the control group (100.75±9.50) at $p<0.05$. Hence, the null hypothesis was rejected, and the research hypothesis was accepted.

Table 6: Association of the Pre-test Level of Academic Stress with the Selected Demographic Characteristics among Adolescents in the Experimental and Control Group

Demographic Characteristics		Academic stress		χ^2 Value	p value
		Moderate	High		
Gender	Male	17	14	0.474^{ns}	0.491
	Female	23	26		
Type of family #	Nuclear	27	29	0.412 ^{ns}	0.921
	Joint	11	9		
	Extended	2	2		
Religion#	Hindu	31	34	1.375 ^{ns}	0.568
	Muslim	1	0		
	Christian	8	6		
Family income	≤15000	13	9	1.003 ^{ns}	0.605
	15001 – 30000	13	15		

	>30000	14	16		
	One	21	22		
	Two	8	7		
	More than two	4	3		
Hobbies #	Reading books	3	3		
	Playing outdoor games	16	11		
	Playing indoor games	1	0	2.958 ^{ns}	0.581
	Listening to music	13	15		
	All the above	7	11		
Place of residence	Rural	18	15	0.464 ^{ns}	0.496
	Urban	22	25		
Educational status of the parents	SSLC and Above	16	14		
	PUC	12	14	0.287 ^{ns}	0.866
	Degree and Above	12	12		
Medium of instruction in high school #	English	39	38	0.000 ^{ns}	1.000
	Kannada	1	2		
Additional coaching	No	25	26	0.054 ^{ns}	0.816
	Yes	15	14		

ns: non-significant, # Fisher's exact test

The table 6. findings showed that all the p-values are above 0.05, indicating an absence of an association of academic stress with the demographic characteristics listed in the table. Thus, the research hypothesis was rejected, and the null hypothesis was accepted.

IV. Discussion

The level of academic stress among subjects of experimental and control groups was assessed both before and after the intervention, revealing that the majority of the subjects 72.5% in the experimental and control groups had moderate levels of academic stress, and 27.5% had high levels of academic stress in the experimental and control group. After the intervention, 95% of adolescents in the experimental group had a moderate level of academic stress, and only 5% had a high level of academic stress. However, in the control group, 70% had moderate levels of academic stress, and 30% had high levels of academic stress.

Similar to the present study, a study conducted in Tamil Nadu showed that the majority of the subjects in experimental and control groups had moderate levels of stress 100% before the intervention. After the intervention, the experimental group showed 33.33% of mild stress, and 66.67% had moderate stress.(Arunkumar, G. 2015).

Another study strengthened this finding, which was conducted in Tamil Nadu among 60 nursing students. The research results demonstrated a notable decline in mean stress scores within the experimental group, from 37.9±4.48 to 23.5±3.02 ($p<0.05$). In contrast, the control group did not show a comparable drop (Sun, J., Zhuo, J., Chu, H., Wang, J., Chen, T., Li, B., et al. 2024).

Effect of Tai Chi exercises on Academic Stress among Adolescents

In the current study, in the Experimental group, post-test academic stress level was significantly reduced. Whereas in the Control group, the post-test academic stress level was significantly higher than the pre-test, indicating that Tai Chi exercise was effective in reducing academic stress among adolescents.

These findings are supported by the longitudinal study which involved Tai Chi exercises for 12 weeks (Sun, J., Chu, H., Wang, J., Chen, T., Zheng, H., Xu, Y., Dong, J., & Cicchella, A. 2023), and another meta-analysis which analysed the results of RCT's conducted among teenagers.(KabiriDinani, S., Mehrabi, T., & Sadeghi, R. 2019).

Further current study findings are also in line with the findings of the study conducted among nursing graduates, which substantially reduced stress, anxiety and increased self-confidence levels among the participants. Also, another study conducted among health professionals (Cezário, L. R. A., Ambrosano, G. M. B., Ambrosano, G. B., Taíra, A., Possobon, R. de F., Meneghim, M. de C., et al. 2023) supported the findings of the present study

Association of the Pre-test Level of Academic Stress with the Selected Demographic Characteristics

The result of the current investigation showed that there was no significant association between the pre-test level of academic stress of the experimental and control groups with selected demographic characteristics ($p>0.05$)

In line with current study findings study conducted in Salem also noted no significant association of stress with sociodemographic factors.[7]

V. Limitations

- Students needed additional motivation to engage in and consistently practice Tai Chi exercises each day for 21 days.

VI. Suggestions

- Educational institutions should take the initiative to train their students on complementary therapies to manage academic stress.
- Various alternative therapies to manage stress in children based on the age group can be included in the curriculum

VII. Recommendations

Considering the findings, subsequent modifications are advised:

- Perform a study with a more extensive sample size to enable the findings to be applied to a broader population.
- Investigate the effectiveness of other alternative therapies for reducing academic stress in adolescents.
- Conduct the study in different settings.
- Explore the study with children from various age groups.
- Execute a comparison-based longitudinal investigation to examine the consequences of Tai Chi techniques versus yoga on reducing academic stress among adolescents.

VIII. Conclusion

The conclusion of the findings of the present study was that Tai Chi exercises been able to reduce academic stress among adolescents effectively

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Conflict of Interest: There is no conflict of Interest

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