

EFFECT OF SLOW-DEEP BREATHING EXERCISE TO REDUCE ANXIETY AMONG ADOLESCENT SCHOOL STUDENTS IN A SELECTED HIGHER SECONDARY SCHOOL IN COIMBATORE, INDIA

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Abstract

The present study explored the effect of slow-deep breathing exercise to reduce the level of anxiety among adolescent students. The study was designed as pre test post test control group design. Stratified random sample of 100 adolescent students studying in a higher secondary school was recruited for the study. The selected participants were randomly assigned to experimental and control groups. Spielberger's state -trait anxiety inventory was administered to assess the level of anxiety. Slow- deep breathing exercise was taught and instructed the participants to practice 30 minutes every day for a period of 45 consecutive days. A post test was conducted to evaluate the effect of slow-deep breathing exercise after 45 days. The collected data were statistically treated. The result revealed that there is a significant effect of slow deep breathing exercise in reducing the level of anxiety. Hence, it can be concluded that slow deep breathing exercise facilitate to reduce anxiety. Furthermore, slow-deep breathing exercise can be incorporated in the daily activities of school students which will help students to perform well in the academic activities.

Keywords: anxiety; slow-deep breathing exercise; adolescents; school students

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Introduction

Many studies are evidenced that there is a causal relationship between academic performance and anxiety among students. Anxiety plays a crucial role in lower the academic performance of the students and also endanger to other physical illnesses. Anxiety is one amongst the common psychological disorders in school-aged children and adolescents worldwide (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Particularly, anxieties prevailing in adolescent students, since in developing nations, during this developmental stage, students are expected to achieve high standard of academic records for opting further field of study, avoiding failures and fear of future unemployment that provoke anxiety. In order to prove high academic talents, students are inclined to compete with their peer group members. Further, to avoid threats and insults from their parent, teachers and peer group instigate to exert hard work for achieving high standards. These factors cause to develop a kind of anxiety among students and this has a direct impact on academic achievement. Students with high anxiety are prone to perform academically poor and have impaired verbal working memory skills due to distraction during their anxious state (Hopko, Crittendon, Grant, & Wilson, 2005). Female students exhibit a higher degree of test anxiety than males and there was significant negative correlation exist between test anxiety and academic achievement (Rezazadeh & Tavakoli, 2009).

Specifically, students studying in grade 11 and 12 are expected to prove their high standard since it is the milestone in their academic life and turning point for choosing their career path. Hence, they are intrinsically and extrinsically motivated to perform well in their academic activities in order to choose their better future academic direction. In spite of this, the students are expected to exert more efforts in achieving their goal. Owens et al. (2008) pointed out while executing a task, children trying to manage their anxiety and exert more effort to perform a task well.

Due to high competition, parent's pressure and high expectations, fear of failure, dilemma about the future are the notable factors incline to aggravate anxiety among students. Deb (2001) argues parents' high expectations and pressures towards academic achievements are the major causative factors of anxiety among school children and adolescents in India. Furthermore, anxiety affects adolescents socially, emotionally and academically. Anxiety is

associated with substantial negative effects on children's social, emotional and academic success (Essau, Conradt, & Petermann, 2000) and consequences such as poor social and coping skills, often leading to avoid social interactions (Albano, Chorpita, & Barlow, 2003; Weeks, Coplan, & Kingsbury, 2009); loneliness, low self-esteem, perceptions of social rejection, and difficulty forming friendships (Bokhorst, Goossens, & De Ruyter, 2001; Weeks, Coplan, & Kingsbury, 2009); school avoidance, decreased problem-solving abilities, and lower academic achievement (Donovan & Spence, 2000; McLoone, Hudson, & Rapee, 2006; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005).

Anxiety could be aggravated and experienced by students in conditions such as class atmosphere; interaction with peer group members, examination fears, teacher student interaction and relationships, academic work load, negative attitude towards a particular course or curriculum can be said as state anxiety.

Speilberger classified anxiety into two types viz, state and trait. According to Speilberger (1970) State anxiety is a transitory emotional state/condition of the human organism that varies in intensity and fluctuates over time which is characterized by subjective, consciously perceived feelings of tension and apprehension and activation of the autonomic nervous system found to be low in non stress full and non-threatening circumstances and if the situation is not perceived as threatening. Further, it will be high in circumstance that is perceived by individual as threatening. On the other hand trait anxiety is relatively stable individual differences in anxiety proneness and the disposition to respond with state anxiety in situation which is appraised by the individual as threatening.

State anxiety is one which is aroused due to some temporary condition of the environment such as examination, accident, punishment etc. (Nadeem, Akhtar, Maqbool, & Zaidi, 2012). Similarly, academic anxiety and test anxiety is also a kind of state anxiety which is aroused due to fear of failure, fear of punishment, fear of examination, situations such as school or class room environment and fear and negative attitude towards certain subjects. Rohen Meetei (2012) pointed out academic anxiety is a kind of state anxiety which relates to the impending danger from the environment of the academic institutions including teachers, certain subjects like mathematics, or foreign language etc.

Although, anxiety is treatable but untreated anxiety endure for many years (Mychailyszyn, Mendez, & Kendall, 2010) and suitable interventions may facilitate to decrease the level of anxiety and eventually academic performance improves among anxious students (Ozsivadjian, Knott, & Magiati, 2012). There are numerous clinical and non clinical interventions had been employed by various scholars from ancient period whereas non-clinical procedures are widely practiced across nations. Non clinical behavioural interventions such as prahnayama, slow-deep breathing exercises, rhythmic breathing exercise, abdominal breathing, nasal breathings, sudharsharn kriya breathing, meditation techniques, transcendental meditation (Maharishi Mahesh Yogi, 1968), Simplified physical exercise (Vedathiri & Magarishi, 1997) proposed by ancient Yogis and Rishis in Asia, specifically in India evidenced remarkably. Brown and Gerbarg (2005) noted that Sudharshan Kriya Yogic breathing alleviates anxiety, stress, depression, post traumatic stress and stress related medical illnesses. Wallace (1970) has reported physiological changes during transcendental meditation include decreased metabolic rate, increased skin resistance, and diminished heart rate. Similarly, a comparison made by Sawane and Gupta (2013) indicates both yoga and swimming was found to be similar in decreasing anxiety. Mindfulness program decreased anxiety and increased self concept and also there was a statistical improvement noted in the academic performance among secondary school students (Franco, Mañas, Cangas, & Gallego, 2011). An open trial of treating anxiety with mindfulness for anxious children revealed a significant decrease in the level of anxiety (Semple, Reid, & Miller, 2005). State anxiety among children with severe asthma decreased due to relaxation breathing training (Chiang, Ma, Huang, Tseng, & Hsueh, 2009).

Slow Deep Breathing Exercise

Breathing is a normal physiological function that is most essential for all human and animals as a basic survival need. The normal respiration rate for human is about 20 to 22/minute. Ganesan and Ganesan (2010) stated normal breathing per minute is about 15 sets of inhalation and exhalations. Whereas during emotional attacks and anxious states autonomic nervous system triggers the physiological variables such as heart rate, respiration, blood pressure, hormonal secretion, palpitation, gastro intestinal functions suddenly elevates,

consequently normal behavioural and social functions of the individual is get disturbed.

Inhaling a fresh deep breath facilitate individuals to intake more oxygen and educes Carbon Di Oxide. Hence, fresh oxygen is supplied to the brain that rejuvenates the brain cells and facilitates for optimum amount of blood supply and sound circulation of blood. Simultaneously, repeated practice of such exercise helps individual to learn and achieve concentration power, emotional control, muscle relaxation etc. Further, this employs as a counteracting behavior to overcome from undesirable habituated emotional responses gradually and stimulates progressively to loosen its ability to evoke anxiety. Practicing of slow- deep breathing exercise relieves stress, anxiety, anger, and other emotional disturbances (White, 1975; Sellakumar, 2010). Similarly, reduction in the breathing facilitates to inhibit psycho physiological arousal and results in relaxation response (Ganesan & Ganesan, 2010). Slow breathing with prolonged expiration reduced physiologic and psychological arousal in anxiety provoking situation in a randomized study among 39 male and 21 female college students (Cappo & Holmes, 1984).

Slow Deep Breathing Exercise as a Behavior Therapy

Behaviour therapies are formulated based on learning theories. Practicing slow deep breathing exercises develop a voluntary control over the autonomic nervous function. Hence, the conditioned anxiety arousal responses begin to diminish stage by stage due to repeated practice of slow deep breathing exercise. Like in classical conditioning of Pavlov, conditioned stimulus (CS) slow deep breathing exercise is introduced and paired with the unconditioned Stimulus (UCS) anxiety arousal responses to elicit a conditioned response (CR) relaxation. Repeated practice of such exercise strengthen the conditioned response and extinct the anxiety reactions.

Objectives

Main Objective

To evaluate the effect of slow deep breathing exercise to reduce anxiety.

Specific Objectives

1. To assess the level of state, trait and overall anxiety among adolescent school students;
2. To employ slow deep breathing exercise among adolescent school students;
3. To assess the level of state, trait and overall anxiety among adolescent school students after slow deep breathing exercise;
4. To evaluate the effect of slow deep breathing exercise on anxiety.

Hence, based on the literature evidences, a non clinical approach was utilized and its efficacy was assessed to reduce anxiety among school students. Keeping these ideas in view the following hypotheses were formulated.

Hypotheses

1. There is significant decrease in the level of state anxiety after slow deep breathing exercise.
2. There is a significant decrease in the level of trait anxiety after slow deep breathing exercise.
3. There is a significant decrease in the overall anxiety after slow deep breathing exercise.

Method

Participants

The present study participants were recruited from a Private higher secondary School, located in Coimbatore, Tamilnadu, India. Stratified random sample of 100 students were recruited from the population of 500 girls and boys belongs to grade 6 to 12. Their age ranged between 11 to 17 ($M=13.99$; $SD=1.90$). From the selected 100 sample, equal number of participants was allocated to experimental and control groups respectively.

Measure

To measure anxiety, Spielberger's State-Trait Anxiety Inventory (Spielberger et al., 1970) was administered. The Scale consists of 20 State anxiety and 20 trait anxiety question items with four point Likert scale. The

minimum possible score is 20 and maximum is 80 for both state and trait anxiety. The scale has high reliability and validity.

Slow - Deep Breathing Exercise

Slow deep Breathing exercise is a form of yogic breathing technique employed by many scholars to treat minor psychological illnesses and maintain general wellbeing. This exercise module was developed by the present investigator with the combination of various breathing techniques viz. rhythmic breathing, pranayama, sudarshan kriya, slow breathing exercise and deep breathing exercise. Inhaling deep breath from the lower abdomen through nostril slowly and holding the breath for a few seconds and then exhaling the breath two times slower than the inhaling develops relaxation and voluntary control over the autonomic nervous function. Repeated practice of this breathing exercise strengthens a conditioned state of relaxation.

Procedure

Before embarking the interventional procedure the following steps were strictly followed and instructions were distinctly recited to the participants and prerequisites were maintained before commencement of each session of this intervention.

Step I. All participants were assembled in a hall with adequate silence, ventilation and lighting.

Step II. Participants were instructed to sit comfortably on a mat with equal gap between each other.

Step III. Keep the palms on the knee and keep open upwards.

Step IV. Sit steadily with spinal cord (body) and neck erect.

Step V. Close the eyes and inhale a deep breath slowly from the lower abdomen and hold the breath for a few seconds and exhale the breath two times slower than inhaling.

Step VI. Continue the same procedure until you told to stop.

These above cited instructions and procedures were suggested to practice for 30 minute daily for a period of 45 consecutive days. The participants were instructed to practice this exercise minimum three hours after food intake.

Design

One group pre test post test control group design was adopted for the study.

Statistical Analysis

The collected data was statistically treated. For the main statistical analysis descriptive and inferential statistical methods were used to analyze the data. Mean, SD, Mean difference and 2 x 2 repeated measures ANOVA was employed to analyze the data.

Results

Background data of the participants

Table 1 Shows the Mean, SD of the participants (N=100)

Variables	Males			Females		
	N	M	SD	N	M	SD
State Anxiety	52	48.26	7.43	48	59.37	7.43
Trait Anxiety	52	49.55	9.27	48	49.27	6.97
Overall Anxiety	52	97.69	8.89	48	100.10	6.62

Note: SD = Standard Deviation

Table 1 shows Anxiety scores of male and female participants before slow deep breathing exercise. State Anxiety of the male participants (M=48.62, SD=7.43) is lesser than the female participants (M=59.37, SD=7.43), Trait anxiety of the male participants (M=49.55, SD=9.27) is lesser than the female participants (M=49.27, SD=6.97) are similar and overall anxiety score of the male participants (M=97.69, SD=8.89) is found to be lesser than the female participants (M=100.10, SD=6.62). The mean score of overall anxiety of the female participants are much higher than male participants since their state anxiety score is higher than males.

Table 2. Show the descriptive statistics of experimental and control groups (N=50)

Groups	Experimental group				Control Group			
	Pre test		Post test		Pre test		Post test	
Variables	M	SD	M	SD	M	SD	M	SD
State Anxiety	49.74	7.71	36.74	8.14	49.46	6.86	49.66	6.08

Table 2. Show the descriptive statistics of experimental and control groups (N=50) - *continued*

Groups	Experimental group				Control Group			
	Pre test		Post test		Pre test		Post test	
Trait Anxiety	48.76	6.56	38	7.86	50.08	9.59	49.90	8.80
Overall Anxiety	98.16	8.65	74	15.17	99.54	7.17	99.62	7.46

The above Table 2 shows the level of significance between experimental group and control groups before slow deep breathing exercise. On analyzing the pre test and post test mean scores of State anxiety (M=49.46, SD=6.86; M=49.66, SD=6.08), Trait anxiety (M=50.08, SD=9.59; M=49.90, SD=8.80) and Overall Anxiety (M=99.54, SD=7.17, M=99.62, SD=7.46) of the control group there is no significant difference identified. Similarly, on analyzing the pre test and post test scores of the State anxiety (M=49.74, SD=7.71; M=36.74, SD=8.14), Trait Anxiety (M=48.76, SD=6.56; M=38.00, SD=7.86), Overall Anxiety (M=98.16, SD=8.65; M=74.00, SD=15.17) there is significant difference.

Table 3. Shows the 2 x 2 Repeated Measures ANOVA of Pre test post test State Anxiety of Experimental and Control Groups

Source	Type III Sum of Squares	df.	Mean Square	F	p	Effect Size
State Anxiety	2048	1	2048	79.866	.000	0.449
State Anxiety x Group	2178	1	2178	84.936	.000	0.464
Error	2513	98	25.64			

The Mean and Standard Deviation is presented in Table 2. There is a significant effect of slow deep breathing exercise on state anxiety among experimental group participants ($F(1, 98)=79.866, p<.05$). Experimental group participants who practiced slow deep breathing exercise were found to have decreased their state anxiety scores in the post test. There is a significant interaction effect between over time and group ($F(1, 98)=84.936, p<.05$). Thus, H_1 "There is a significant decrease in the level of state anxiety after slow deep breathing exercise" is accepted.

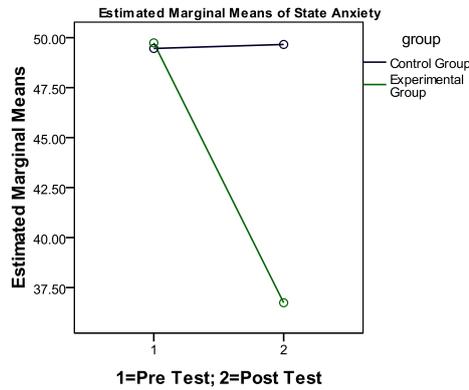


Figure 1. Shows the State Anxiety Mean Scores of Pre test and Post test scores of Experimental and Control Groups

Table 4. Shows the 2 x 2 Repeated Measures ANOVA of Pre test post test Trait Anxiety of Experimental and Control Groups

Source	Type III Sum of Squares	df.	Mean Square	F	p	Effect Size
Trait Anxiety	1496.04	1	1496.04	59.568	.000	0.378
Trait Anxiety x group	1399.20	1	1399.20	55.712	.000	0.362
Error	2461.25	98	25.11			

The mean and Standard deviation is presented in the Table 2. There is a significant effect of slow deep breathing exercise on trait anxiety among experimental group participants ($F(1, 98)=59.568, p<.05$). There is a significant decrease in the level of trait anxiety among experimental group participants. There is a significant interaction effect between over time and group ($F(1, 98)=55.712, p<.05$). Thus, H_2 “There is a significant decrease in the level of Trait anxiety after slow deep breathing exercise” is accepted.

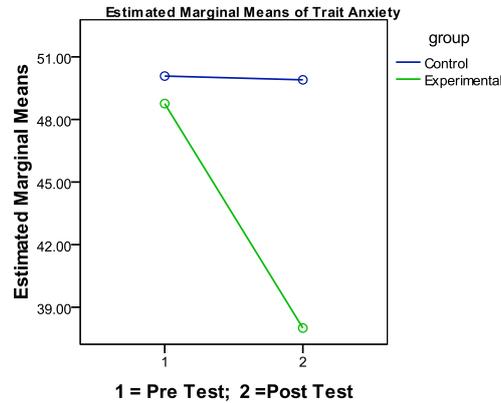


Figure 2. Shows the Trait Anxiety Mean Scores of Pre test and Post test scores of Experimental and Control Groups

Figure 2 Denotes the pre test post test mean scores of experimental and control group on Trait anxiety. The pre test mean Score (M=50.08) and post test mean score (M=49.90) of the control group is slightly reduced when compared to pre test and post test. Whereas the mean scores of pre test (M=48.76) and post test (M=38.00) of the experimental group is found to be significantly decreased compared to pre test and post test. This significant difference is attributed the influence of slow deep breathing exercise intervention practiced by the experimental group participants. The control group participants did not exhibit a significant difference in the mean scores of trait anxiety, though there is a slight difference in the mean scores of pre test and post test. Since the control group participants were not participated in the intervention program.

Table 5. Shows the 2 x 2 Repeated Measures ANOVA of Pre test post test Overall Anxiety of Experimental and Control Groups

Source	Type III Sum of Squares	df.	Mean Square	F	p	Effect Size
Overall Anxiety	7248.08	1	7248.08	126.453	.000	0.563
Overall Anxiety x Group	7344.72	1	7344.72	128.139	.000	0.567
Errors	5617.20	98	57.31			

The mean and Standard Deviation is presented in the Table 2. There is a significant effect of slow deep breathing exercise on Overall anxiety ($F(1, 98)=126.453, p<.05$). The experimental group participants who practiced slow deep breathing exercise was found to have decreased their overall anxiety score over time. There is a significant interaction effect was found between over time and group ($F(1, 980)=128.139, p<.05$). Thus, H_3 “There is a significant decrease in the level of overall anxiety after slow deep breathing exercise” is accepted.

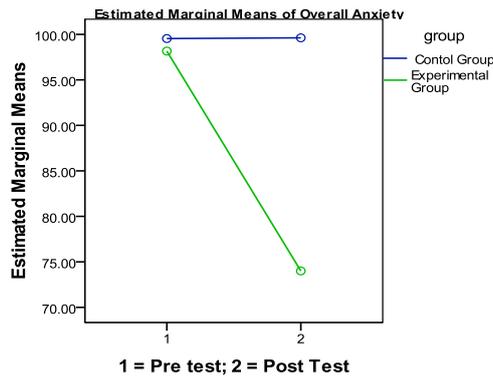


Figure 3. Shows the pre test post test mean scores of overall anxiety among experimental and control group

The above figure denotes the pre test and post test mean scores of overall anxiety among experimental and control group. The Mean Score of the control group in the pre test ($M=99.54$) and post test is ($M=99.62$), it is obvious that there is no significant difference found between pre test and post test scores of overall anxiety among control group. The mean Score in the pre test ($M=98.16$) and post test ($M=74.00$) scores of overall anxiety in the experimental group is found to be reduced. This significant difference in the level of overall anxiety is attributed to the reduction in the level of both state and trait anxiety. However, the mean score of state anxiety is found to be reduced much higher than that of the trait anxiety.

Discussion

The present findings shows mean score of the two dimensions of Spielberger’s anxiety and its combination of these two dimensions. While

comparing the state anxiety of male and female students, the mean score of females ($M=59.37$) is much higher than that of males ($M=48.26$) whereas the mean score of trait anxiety among both males ($M=49.55$) and females ($M=49.27$) are found to be similar. Overall mean anxiety scores of females ($M=100.10$) is higher than that of males ($M=97.69$) since their state anxiety score is also higher than that of males, attributed to score more in overall anxiety. The present result is consistent with the results obtained by Campbell and Rapee (1994); Costello, Egger, and Angold, (2003); Poulton, Milne, Craske, and Menzies, (2001); Weiss & Last (2001). Despite, this finding is contrast with the result obtained by Sibnath Deb, Pooja Chatterji and Kerryan Walsh (2010). In that study boys were found to be more anxious than girls, whereas the present study revealed that female students are found to be more anxious than boys. This result clearly shows that girls are found to be high in state anxiety, such as examination, class room set up, school environment and other factors might have attributed to anxiety symptoms. This difference may be attributed to the environmental and cultural variations of the population studied and also factors such as interpersonal interaction, parent's and teacher's approach and curriculum variation.

On observing the level of overall anxiety of adolescent school students is found to be high and across gender girl student's anxiety level is much higher than that of boys. Comparing the dimensions of anxiety, girls are found to be high in state anxiety but the level of trait anxiety is found to be almost equal in both genders. There was no significant difference found between experimental and control group in the pre test condition is attributed to the homogeneity of the participants. While comparing the experimental and control group in the post test condition there is a significant difference found and the mean scores of experimental group is remarkably reduced compared to the pre test condition however there is no significant difference between pre test and post test mean scores of the control group. This result is attributed due to the practice of slow deep breathing exercise intervention for a period of 45 days. After 45 days of this intervention, the post test mean score of the anxiety in all three levels i.e state, trait and overall anxiety of the experimental group is significantly reduced compared to the pre test mean score. Therefore, it is evident that the intervention influenced in reducing the level of anxiety. This result is consistent with the study of Dighore and Gadkari (2013) yogic exercises and meditation reduced anxiety. And also the present finding is in line with the study

conducted by Franco et al. (2011). In that study mindfulness was found to be effective in reducing anxiety. Similarly, slow deep breathing is one amongst a behavioral intervention formulated with the combination of various yogic breathing techniques employed to manage anxiety. The result herein obtained also substantiates the anxiety score of the participants is found to be remarkably reduced after this intervention.

The significant main effect is attributed to the influence of the intervention herein employed. As well the significant main effect it is further attributed to group and time interaction that was cross examined statistically with Repeated Measures (split-plot) ANOVA. The result shows that there is a significant difference in the state, trait and overall anxiety of the pre test and post test mean scores. And there is a significant interaction effect found between the groups (control and experimental) and time (pre test and post test).

Anxiety is an emotional state could be aroused due to specific situational factors that can be managed by employing/practicing certain behavior modification therapeutic techniques. Among behavior modification techniques, slow-deep breathing exercises -a form of yogic breathing, a simple and powerful technique to reduce anxiety symptoms gradually if practiced regularly for a specified period of time with the proper instructions and assistance by a trained behavior therapist. Consequently, manifestations of anxiety related symptoms would gradually begin to diminish and academic performance and academic achievement among students will improve. From the above result it is clearly understood that slow deep breathing exercise facilitated in enhancing the academic performance by reducing the level of anxiety. Hence, slow deep breathing exercise yielded a positive outcome in reducing anxiety and enhancing academic performance.

Conclusions

There is a significant decrease in the level of anxiety after slow deep breathing exercise.

The mean score of the state, trait and overall anxiety of the participants herein studied before slow deep breathing exercise intervention was found to be similar between experimental and control groups.

The mean score of the state, trait and overall anxiety of the experimental group participants significantly decreased after slow deep breathing exercise.

There is a significant difference between experimental and control group after slow deep breathing exercise.

Therefore, slow deep breathing exercise is attributed to decrease the level of anxiety among the participants. Practicing slow deep breathing exercise would decrease level of anxiety and facilitates for academic achievement.

Implications

Slow-deep breathing exercise is simple to understand and easy to practice which can be applied to any group of population and has no side effects.

A non clinical method can be employed to treat people who are encountering anxiety related problems.

This piece of study entail for further investigation in the field of Educational psychology and behavior therapy.

Educating this exercise to and self administration of this procedure enact remarkable progress in the academic performance and academic achievement among students.

Slow deep breathing exercise can be incorporated in the curriculum to manage emotional problems of students namely stress, test anxiety, situational anxiety, stage fright etc.

To perform well in academics, learning such behavior therapeutic technique will help students to overcome from behavior problems.

Recommendations

Based on the present study findings, further investigations can be conducted in other settings.

Such yogic breathing exercise as a behavior therapy can be attempted to alleviate other psychological problems.

This technique can be applied to manage stress, anger and other psychosomatic illnesses.

To relieve academic anxiety among students, teachers and school counselors can employ slow deep breathing exercise as a therapeutic intervention.

Similar study can be conducted with large size sample from various populations.

The present study result can be documented for further research and therapeutic applications.

A cross sectional experimental study can be conducted to evaluate the efficacy of this intervention.

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