Original Research Article

Effectiveness of Buteyko Breathing Technique on Test Anxiety among College Students: A Randomized Controlled Trial

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ABSTRACT

Background and Objectives: Anxiety is a common phenomenon that constitutes a universal cause of poor academic performance among students worldwide. It is a kind of self pre occupation which is manifested as minimization and results in negative cognitive evaluation, lack of concentration, and academic failures. or failure on an exam or similar evaluative situation. College students experience high stress due to various reasons such as lack of preparation, style of their study and lack of needed information. When stress is perceived negatively or excessive it leads to anxiety and it may affect their academic performance. The purpose of this study is to find out the effectiveness of Buteyko breathing technique on test anxiety among college students.

Methodology: A total of 16 subjects were selected based on inclusion and exclusion criteria, then divided in to two groups. Group A (Experimental group n= 8) received both Buteyko breathing technique and Anulom vilom pranayama, Group B (control group n=8) received Anulom vilom pranayama. Exercise program was held for five days a week (30 minutes) for 4 weeks. Test anxiety, FEV1 and quality of life were measured at the beginning and fourth week after intervention using west side test anxiety scale 9, PFT and SF36.

Results: The results were analysed using paired and independent t test. The significant level was kept as p< 0.05. The post test result in case of test anxiety, p < 0.01, shows there is a significant difference in post test scores between experimental and control group.

The post test result in case of FEV1, p = 0.29, which shows that there is no significant difference in post test score between experimental and control group.

The post test result in case of MCS, p < 0.05, which shows that there is significant difference in post test score between experimental and control group

The post test results of OCS, p =0.17 shows that there is no significant difference in post test score between experimental and control group.

Conclusion: The study concluded that Buteyko breathing significantly reduce the level of test anxiety in experimental as well as control group. But the experimental group shows significant reduction in test anxiety than control group.

Key Words: Buteyko breathing, Test anxiety, Anulom vilom pranayama, FEV1, Quality of life

INTRODUCTION

Anxiety is a common phenomenon that constitutes a universal cause of poor academic performance among students worldwide.(1). It is a kind of self pre occupation which is manifested as minimization and results in negative cognitive evaluation, lack of concentration, and academic failures.(1). Test anxiety is a multidimensional construct that has been

defined as - the set of phenomenological, physiological and behavioural responses that accompany concern about possible negative consequence or failure on an exam or similar evaluative situation(2). College students experience high stress due to various reasons such as lack of preparation , style of their study and lack of needed information.(3). When stress is perceived negatively or excessive it leads to anxiety and it may affect their academic performance. (3)

Test anxiety is a phenomenon well known to many students for ages. Test anxiety is experienced in achievement contexts that are perceived as potentially threatening to ones self-esteem (example important exams). Test anxiety is a multidimensional construct (Pekrum, 2006); on a physiological level, test anxious students might experience sweating, palpitations, trembling's and nausea. Cognitively, test anxiety comes along with specific worry thoughts including negative cognitive self statements regarding academic failure. Additionally, test anxious individuals might experience social worry thoughts as they fear to be negatively judged by teachers parents and others (Lower et al ;2008). On an effective level test anxiety is associated with unpleasant feelings of agitation, insecurity and helplessness, which may evoke certain motivational consequences such as avoidance tendencies.(4)

A low level of stress is necessary, but it is sometimes so complicated that it limits individual performance in test and lead to behavioural disorders or low confidence or low confidence or poor academic performance. An acceptable level of test anxiety in students motivate them to work hard and provides them with its positive consequences. Nowadays test anxiety is more observed among students and it might be due to more prominent role of test in educational systems.(5)

Literature shows that most students experience test anxiety during exam but when the anxiety interferes with the students capacity to perform in exam adequately and express their knowledge on examination it becomes a problem, in fact test anxiety is a great obstacle in the way of many individual to reach their real academic destination.(6).

Evidences also suggest that medical school programs are characterized by challenging classes and high credit load in each academic turn which in turn is associated with higher rate of test anxiety resulting poor academic performance. Several studies revealed that the major factors associated with test anxiety were female sex, inability to manage time and lacking study skills, low previous grade support, excessive course load and lack of revision during the exam.(6)

Having anxiety is strongly associated with respiratory symptoms. The nature of relation between psychological status and respiratory symptoms and underlying mechanism are still unknown. In some studies psychological symptoms have been related to higher risk of developing asthma. Other studies shows that badly controlled asthma and respiratory symptoms such as breathlessness can lead to generalized anxiety disorders.(10). Pulmonary function test allows physician to evaluate respiratory function. They are reproducible and accurate. The main results of PFT included forced vital capacity, forced expiratory volume,

The emotions experienced in academic environment are known to be related to important outcomes, such as academic adaptation and success, and also students' health and wellbeing. However factors such as anxiety and stress can lead to poor academic performance and illness. (7)

However many people experiencing high level of anxiety do not seek a medical opinion or choose not to accept psychological or pharmaceutical intervention preferring instead of self-manage their condition. Yoga, a form of mind body therapy has become a popular approach to achieving and maintaining wellness. Yoga practitioner have reported

reduced stress level and greater relaxation (Stussman et al;2015)(11).

Yoga based practices may serve to regulate the autonomic nervous system. Autonomic nervous function dysfunction is associated with depression and anxiety. There are some researches showing that yoga does increase PNS activity and regulate GABA in thalamus, thus in control mood sand regulate anxiety.(12)

Evidence shows that practicing reduced breathing exercise that modify carbon dioxide tolerance have been showed to provide therapeutic benefits for those suffering from anxiety and depression.

While many breathing strategies aim to slow breathing, the Buteyko breathing named after the originator Konstantin Pavlovich Buteyko, is the only breathing strategy that decrease breathing volume to generate a tolerable need for oxygen. Buteyko breathing has been shown to help people with asthma to control symptoms such as wheezing, coughing, breathlessness or a blocked nose. The Buteyko breathing technique is also claimed to be helpful for people with other problems. These include hyperventilation, panic attacks, COPD.

Hence the title of the study is stated as - effectiveness of Buteyko breathing in test anxiety among college students. a randomized controlled trail

METHODOLOGY
STUDY DESIGN
Randomized controlled trial

STUDY SETTING
KVM College Of Nursing, Cherthala
Medical Trust Institute Of Medical Science, Irumpanam

STUDY DURATION
6 months
5 days / week

SAMPLING
Sampling method:
Simple Randomization method Size

n = 16
8 subjects in each group (group A and group)

Inclusion criteria
- Male and female college students
- Age group – 18 to 25 years
- West side test anxiety score – score 3 to 5

Exclusion criteria
- COPD patients
- Non-athletes
- Smokers
- Alcoholics
- Subjects on hypertensive medicine
- Cardio pulmonary disease
- Epilepsy

Sampling procedure
The total study duration was 4 weeks, 16 students both male and female, age18 to 25 yrs were selected from two colleges through simple randomization method according to inclusion and exclusion criteria. The study was conducted through google meet app during different study period.

The subjects are divided in to two groups
- Group A (experimental group) - 15 minutes of Buteyko breathing and 15 minutes of Anuloma Viloma pranayama – 8 subjects
- Group B (conventional group) – 15 minutes of Anuloma Viloma pranayama- 8 subjects

METHODS
Outcome measures.
1. west side test anxiety scale – to asses test anxiety of college students
In developing a measurement for assessing the level of test anxiety, Driscoll (2004) devised the Westside Test Anxiety Scale (WTAS)as a concise instrument which could be completed by respondents in approximately 5-8 minutes.

It consisted of ten brief items and it is measured in five points Likert scale. Total

score was divided by ten to obtain the mean value in which a mean score of less than 3 was considered as normal or low anxiety whereas mean score of more than 3 showed test anxiety

2. Pulmonary function test - to find out Fev1

Pulmonary function test allows to evaluate the respiratory function of the subjects. They are reproducible and accurate.

Spirometry measures airflow .By measuring how much air you inhale and how quickly you exhale. In a spirometric test while you are sitting, you breath in to a mouth piece that is connected to an instrument called a spirometer. The spirometer records the amount and rate of air that you breath and out over a period of time.

To measure fev1 , the subject take a deep breath in, as large as possible, and blows out as hard as fast as possible and keep going until there is no air left.

Figure 1 ; PFT

3. SF36 – To measure quality of life.

The SF-36 is considered to be a valid, reliable, concise, and generic measure of state of health that is potentially useful for application to students.

Compared with other questionnaires designed to evaluate QOL, the SF-36 questionnaire is short and flexible, which makes it much easier to administer. The SF-36 questionnaire can be completed manually or with the aid of a computer, by individuals, via a face-to-face interview or by telephone call with trained surveyors. The SF-36 questionnaire is widely used to monitor general population health status, to evaluate the efficacy of interventions, to monitor health status in patients with chronic disease and to determine the relative burdens of various disease. It consist of eight scales; physical functioning, role physical, bodily pain, vitality, social functioning, general health, role emotional and mental health. There are two distinct concept measured by SF36; PCS and MCS. The correct calculation of SF36 measures PCS and MCS.

Methods of data collection
Materials used
Yoga mat, Thermometer, Sphygmomanometer, Mouth piece, Weighing machine, Pulse oximeter, Stethoscope, Stadiometer

Figure 2;yoga mat

Figure3;Thermometer

Figure 4 ; sphygmomanometer

Figure 5; mouth piece

Figure 6; weighing machine

Figure 7; pulse oximeter

Figure 8 ; stethoscope

Figure 9;Stadiometer

PRE INTERVENTION PROCEDURE

Ethical approval was obtained from the ethical committee of Medical Trust Hospital, Cochin for conducting the study. A total 60 west side test anxiety scale were distributed to students. They were requested to fill the form prior to their exam. Students who scored 3 or more score in west side test anxiety score and fulfilled the inclusion criteria were short listed. Informed consent and description of the study were given to the students. After signing the consent a total of 16 students were taken and divided in to two groups by lottery method.

Pre-intervention measurements were taken for both groups using west side test anxiety scale, PFT and SF36 questionnaire. The active intervention period last for 4 weeks.

INTERVENTION
Control group

A google meet session was conducted. A total of 7 students were recruited for control group. A detailed class was taken to them about test anxiety and its adverse effects on their academics and exams. They were taught anulom vilom pranayama techniques.

Guidelines

1. The students were asked to perform Anulom vilom in an empty stomach, preferably 4 hours after they have eaten. They were asked to perform in a cool, comfortable environment.
2. They were asked to perform for a minute. The first time of try, may feel a little strange, so only do it as long as they are comfortable.
3. Don't force themselves beyond their comfort zone - they can always try again another time. It's important to feel in control and relaxed. Increase their time at your own pace.

Procedure

● Choose a meditating sitting posture. Instruct them to keep their spine and neck straight and close their eyes.
● Ask them to clear their mind of everything outside of this moment.
● Start with their outer wrists resting on your knees.
● Using their right hand, fold middle and index fingers toward their palm.
● Place their thumb on right nostril and their ring finger on the left nostril.
● Close their right nostril with thumb and inhale through their left nostril, slowly

and deeply, until their lungs are full. Focus on breathing.
- Next, release their thumb and close their left nostril with ring finger.
- Exhale slowly through the right nostril.

- Now do it in reverse, this time inhaling through the right nostril and exhaling through the left.

These sessions were performed by each student in every session. There were 5 sessions a week for continuous four week. Each session lasted for 15 min.

Figure 10; Anulom vilom pranayama

Experimental group
The exercise was conducted through Google meet session and they were taught the importance of Buteyko breathing exercise and anulom vilom pranayama for reducing test anxiety. Gave them a brief idea about the exercise technique.

Guidelines
- When practicing Buteyko breathing, always breathe in and out through the nose.
- If at any time when they experience anxiety, shortness of breath, or intense discomfort, discontinue the practice and breathe normally.
- As progress, they may be able to hold breath for longer periods. Over time, they may be able to hold the Control Pause for 1 minute and the Maximum Pause for 2 minutes.

1. Preparation
1. Sit on the floor
2. Elongate the spine to maintain an upright posture.
3. Relax the respiration muscles.
4. Breathe normally for a few minute

2. Procedure
Normal Breath In Through Nose – Sit down in an upright posture, and take a normal, calm breath through the nose. Do not take a deep breath. Focus on using your diaphragm to breathe, allowing the stomach to expand.

Normal Breath Out Through Nose – Exhale normally through your nose. Again, focus on using the diaphragm to push all air out of the lungs (stomach should move, chest should not).

Shorter Breath In Through Nose – Now, take a shorter, more shallow and light (~1-2 seconds) inhalation through the nose and stop.

Long Breath Out Through Nose – Slowly release the breath over 5 seconds, using your diaphragm to empty out your lungs. Hold breath after complete exhale for 5 seconds.

Repeat Steps 1-4 – Take a normal, calm breath again through the nose (step 1), and repeat the entire process for several minutes. All these exercises were performed by each student in every session. There were 5 sessions a week for continuous 4 weeks. Each session lasted for about 30minute. 15 minutes of anulom vilom pranayama

(conventional exercise) and 15 minutes of Buteyko breathing were performed by experimental group.

Figure 11; Buteyko breathing technique

POST INTERVENTIONAL PROCEDURE

The outcomes measurements were taken after 4 weeks using the west side test anxiety scale, pulmonary function test and SF36.

RESULT

The present study was designed to explore the Effectiveness of Buteyko breathing technique on test anxiety among college students – a randomized controlled trail
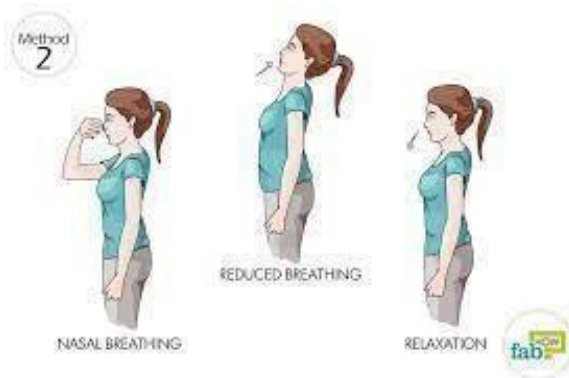
DEMOGRAPHIC INFORMATION

Table 1 – Mean age in experimental group and control group

	Mean age	Standard Deviation	Minimum	Maximum
Experimental group	20.37	1.06	18	25
Control group	20.5	1.19	18	25

The table 7.1 shows, the age group taken for the study was between 18-25 years and the mean age of the experimental group was 20.37 with a standard deviation of 1.06 and the mean age of control group was 20.5 with a standard deviation of 1.19

Table 2 frequency and percentage of age in experimental group and control group

Age	Experimental group		Control group	
	Frequency	Percentage	Frequency	Percentage
21years	3	37.5%	2	25%
19years	2	25%	2	25%
20years	2	25%	2	25%
22 years	1	12.5%	2	25%

The table 2 shows the frequency and percentage of age in both experimental group and control group.
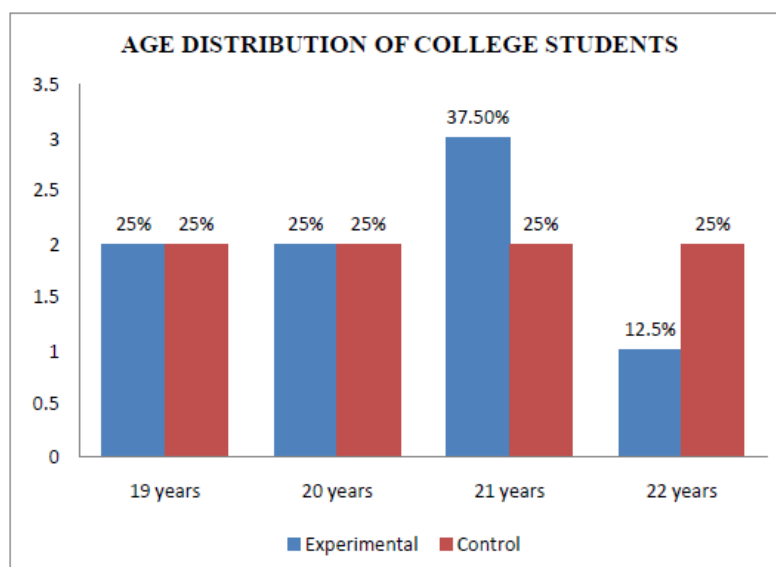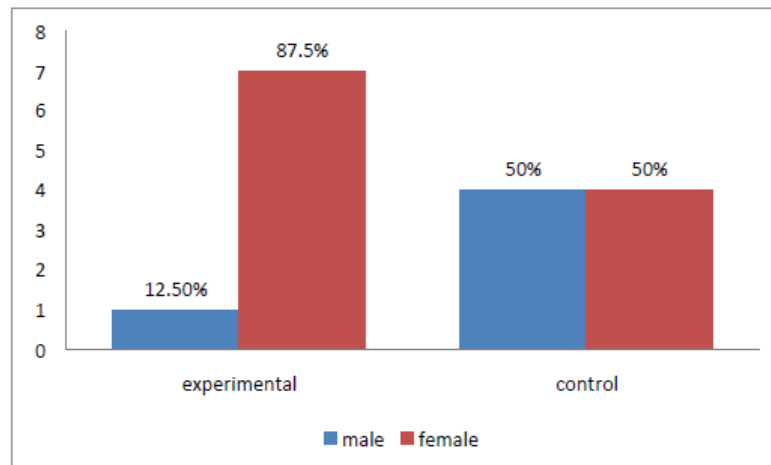

Graph 1 - graphical representation of mean age in experimental group and control group

GENDER

Table 3- frequency and percentage of gender in experimental group and control group.

GENDER	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	Percentage	Frequency	Percentage
Male	1	12.5%	4	50%
Female	7	87.5%	4	50%
Total	8	100.0%	8	100.0%

Table 3 shows the frequency and percentage of gender in both experimental group and control group.
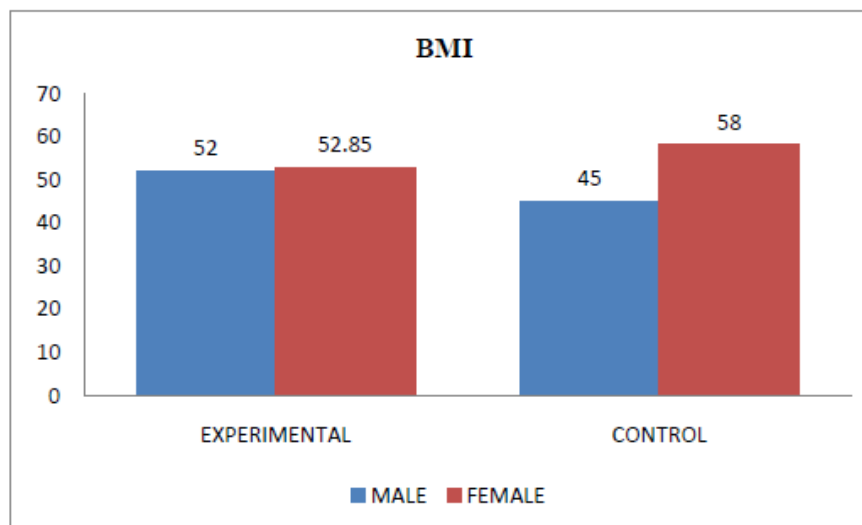

Graph 2 – Graphical representation of gender in experimental group and control group

BODY MASS INDEX

Table 4 – height, weight and BMI of subjects in experimental and control group

GROUP	GENDER	HEIGHT	WEIGHT	BMI
EXPERIMENTAL	MALE	158	20.8	52
	FEMALE	156±6.9	21.6±1.3	52.8±6.8
CONTROL	MALE	158±3.5	23.1±1.13	53±3.8
	FEMALE	146.6±7.27	20.85±0.91	45±5.03

Table 4 shows mean and standard deviation of height, weight and BMI of experimental and control group.

Graph 3- graphical representation of BMI in experimental group and control group.

DATA ANALYSIS AND INTERPRETATION.

The statistical analysis of the results was performed by using the SPSS Software (SPSS.20). Students t - test was used for the calculation of the results. Paired t test was used for the intra group comparison of pre and post test results. Independent t test was used for the inter group comparison. Significant level kept as p<0.05. Equations were used in;

$$\text{Samples} - n \geq \frac{2\sigma2(z\beta + z\alpha/2)2}{\text{difference } 2}$$

- n- Sample size in each group (assumes equal sized groups)

- σ- Standard deviation of the outcome variable
- $Z\alpha$ - Represents the desired level of statistical significance (typically 1.96)
- $Z\beta$ -Represents the desired power (typically 0.84 for 80% power)
- differences- Effect size (the difference in mean)

Independent Variables: Buteyko breathing technique, Anulom vilom pranayama Dependent Variables: test anxiety, pulmonary function, quality of life.

COMPARISON WITHIN GROUP (paired t test)
COMPARISON OF PRE- TEST AND POST TEST VALUES OF TEST ANXIETY IN GROUP A (EXPERIMENTAL GROUP)

Table 5- shows paired t test for test anxiety in group A (experimental group)

Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	3.57	0.43	1.31	16	6.60	7	P < 0.01
Post- test	2.26	0.26					

The mean column displays the mean pre-test and post-test of Test Anxiety scores among college students in the Experimental group. SD is the standard deviations of the test anxiety scores in pre & post respectively. Mean change 1.31 is the difference between pre-test and post-test mean test anxiety scores (3.57 and 2.26).

Since the t- value 6.60 shows p < 0.01, there is a significant difference existing between the pre- test and post-test test anxiety scores among college students in the experimental group. This proves the effect of Buteyko breathing in test anxiety among college students.

COMPARISON OF PRE- TEST AND POST TEST VALUES Of TEST ANXIETY IN GROUP B(CONTROL GROUP)

Table.6 – shows paired t test for test anxiety in group b (control group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	3.45	0.44	0.6	16	3.44	7	P=0.01
Post- test	2.77	0.16					

The mean column displays the mean pre-test and post-test of Test Anxiety scores among college students in the control group. SD is the standard deviations of the test anxiety scores in pre & post respectively. Mean change 0.6 is the difference between pre-test and post-test mean test anxiety scores (3.45 and 2.77). Since the t-value 3.44shows p = 0.01, there is a significant difference existing between the pre-test and post-test test anxiety scores among college students in the control group. This proves the effect of Buteyko breathing in test anxiety among college students.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF FEV1 IN GROUP A (EXPERIMENTAL GROUP)

Table 7 – shows paired t test for FEVI in group a (experimental group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	1.14	0.37	0.02	16	1.5	7	0.16
Post- test	1.16	0.36					

The mean column displays the mean pre-test and post-test of FEV1 among college students in the experimental group. SD is the standard deviations of the FEV1 in pre & post respectively. Mean change 0.02 is the difference between pre-test and post-test mean FEV1 (1.14 and 1.16). Since the t-value 1.5 shows p >0.05, there is no significant difference existing between the pre-test and post-test FEV1 scores among college students in the experimental group.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF FEV1 IN GROUP B (CONTROL GROUP)

Table 8 – shows paired t test for FEVI in group B (control group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	0.99	0.23	0.002	16	1.5	7	0.17
Post- test	1.00	0.23					

The mean column displays the mean pre-test and post-test of FEV1 among college students in the control group. SD is the standard deviations of the FEV1 in pre & post respectively. Mean change 0.002 is the difference between pre-test and post-test mean FEV1 (0.99 and 1.00). Since the t-value 1.5 shows p >0.05, there is no significant difference existing between the pre-test and post-test FEV1 scores among college students in the control group.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF PCS IN GROUP A (EXPERIMENTAL GROUP)

Table 9 – shows paired t test for PCS in group A (experimental group)

Test	Mean	SD	Mean improvement	n	T	df	p value
Pre- test	0.79	0.10	0.10	16	4.21	7	p<0.01
Post- test	0.90	0.07					

The mean column displays the mean pre-test and post-test of pcs among college students in the experimental group. SD is the standard deviations of the pcs in pre & post respectively. Mean change 0.10 is the difference between pre-test and post-test mean pcs (0.79 and 0.90). Since the t- value 4.21 shows p <0.01, there is significant difference existing between the pre-test and post-test pcs scores among college students in the experimental group. This proves the effect of Buteyko breathing on pcs among college students.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF PCS IN GROUP B (CONTROL GROUP)

Table 10 – shows paired t test for PCS in group B (control group)

Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	0.82	0.09	0.01	16	4.14	7	P<0.05
Post- test	0.84	0.09					

The mean column displays the mean pre-test and post-test of pcs among college students in the control group. SD is the standard deviations of the pcs in pre & post respectively. Mean change 0.01 is the difference between pre-test and post-test mean pcs (0.82 and 0.84). Since the t-value 4.14 shows p <0.05, there is significant difference existing between the pre-test and post-test pcs scores among college students in the control group. This proves the effect of Buteyko breathing on pcs among college students.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF MCS IN GROUP A (EXPERIMENTAL GROUP)

Table 11 – shows paired t test for MCS in group A (experimental group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	0.76	0.09	0.11	16	4.6	7	P<0.01
Post- test	0.87	0.04					

The mean column displays the mean pre-test and post-test of mcs among college students in the experimental group. SD is the standard deviations of the mcs in pre & post respectively. Mean change 0.11 is the difference between pre-test and post-test mean pcs (0.76 and 0.87). Since the t- value 4.6 shows p <0.01, there is significant difference existing between the pre- test and post-test mcs scores among college students in the experimental group. This proves the effect of Buteyko breathing on mcs among college students.

COMPARISON OF PRE- TEST AND POST TEST VALUES OF MCS IN GROUP B (CONTROL GROUP)

Table 12- shows paired t test for MCS in group b(control group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	0.76	0.09	0.01	16	1.89	7	P< 0.05
Post- test	0.77	0.08					

The mean column displays the mean pre-test and post-test of mcs among college students in the control group. SD is the standard deviations of the mcs in pre & post respectively. Mean change 0.01 is the difference between pre-test and post-test mean pcs (0.76 and 0.77). Since the t-value 1.89 shows p <0.05, there is significant difference existing between the pre-test and post-test mcs scores among college students in the control group. This proves the effect of butyeko breathing on mcs among college students.

COMPARISON BETWEEN GROUPS(Independent t test)
COMPARISON OF PRE TEST TEST ANXIETYSCORE BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUPS)

Table 13 – shows independent t test for pre test test anxiety score between group A (experimental group) and group B (control group)

Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	3.5	0.43	0.12	16	0.56	14	0.5
Post- test	3.45	0.44					

The Mean column in the t test table displays the mean pre-test test anxiety scores in experimental and control group respectively. The standerd deviation column displays the standard deviation of the scores in two groups. The difference (0.12) shows the difference between mean in two groups (3.5 and 3.45).Since the t-value 0.56, shows p-value > 0.05, there is no significant difference in pre-test anxiety scores between the experimental and the control groups .So

we can consider the groups as homogenous   in the baseline level

COMPARISON OF POST TEST TEST ANXIETY SCORES BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUP

Table 14 – shows independent t test for post test test anxiety score between group A (experimental group) andgroup B (control group)

| Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	2.26	0.26	0.51	16	4.6	14	P< 0.01
Post- test	2.77	0.16					

The Mean column in the t test table displays the mean post-test test anxiety scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.26) shows the difference between mean in two groups (2.26&2.77). Since the t-value, 4.6 shows p-value < 0.01, there is a significant difference in post-test test anxiety score between the experimental and the control groups. The scores in the experimental group are significantly higher than that in the control group. Hence Buteyko breathing technique is effective in test anxiety among college students.

COMPARISON OF PRE-TEST POST-TEST TEST ANXIETY SCORESIN EXPERIMENTAL AND CONTROL GROUPS

Table 15 – shows comparison of pre test post test test anxiety in group A (experimental group) and group B(control group)

Group	Pre test mean	SD	Post test mean	SD
Experimental	3.57	0.43	2.26	0.26
Control	3.45	0.44	2.77	0.16
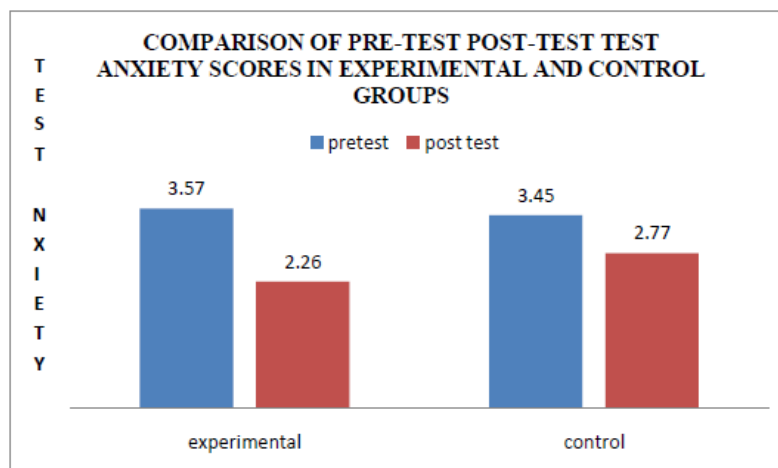
Graph 4 graphical representation comparison of pre test post test test anxiety in group A (experimental) and group B (control group)

COMPARISON OF PRE TEST FEV1 SCORE BETWEEN GROUP AAND GROUP B (EXPERIMETAL AND CONTROL GROUPS)

Table 16-shows independent t test for post test FEV1scores between group A (experimental group) and group B (control group)

Test	Mean	SD	Mean Improvement	n	t	df	p value
Pre- test	1.14	0.37	0.14	16	0.92	14	0.37
Post- test	0.99	0.23					

The Mean column in the t test table displays the mean pre-test test FEV1 scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.14) shows the difference between mean in two groups (1.14 and 0.99).Since the t-value 0.92, shows p-value > 0.05, there is no significant difference in pre- test fev1 scores between

the experimental and the control groups .So we can consider the groups as homogenous in the baseline level

COMPARISON OF POST TEST FEV1 SCORE GROUP A AND GROUPB (EXPERIMETAL AND CONTROL GROUP

Table 17 – shows independent t test for post test FEV1 between group A (experimental group) and group B (control group)

Test	Mean	SD	Mean improvement	N	t	df	p value
Pre- test	1.16	0.36	0.16	16	1.08	14	0.29
Post- test	1.00	0.23					

The Mean column in the t test table displays the mean post-test FEV1scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference(0.16) shows the difference between mean in two groups (1.16 and 1.00).Since the t-value, 1.08 shows p-value > 0.05, there is no significant difference in post- test FEV1 score between the experimental and the control groups.

COMPARISON OF PRE TEST POST TEST FEV1 SCORES BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUP)

Table 18 – shows comparison of pre test post test FEVI in Group A (experimental group) and group B(control group)

Group	Pre test mean	SD	Post test mean	SD
Experimental	1.14	0.37	1.16	0.36
Control	0.99	0.23	1.00	0.23
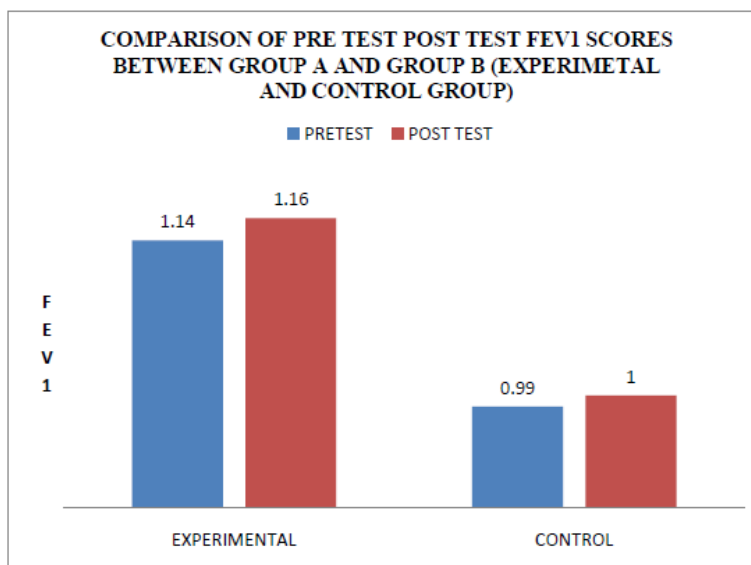
Graph 5 graphical representation of comparison of pre test post test FEV1 in group A (experimental group) and group B (control group)

COMPARISON OF PRE TEST PCS SCORE BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUPS)

Table 19 – shows independent t test for pre test PCS score between group A (experimental) and group B (control group)

Test	Mean	SD	Mean improvement	n	T	Df	p value
Pre- test	0.79	0.10	0.03	16	0.61	14	0.55
Post- test	0.82	0.09					

The Mean column in the t test table displays the mean pre-test PCS scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.03) shows the difference between mean in two groups (0.79and 0.82).Since the t-value 0.55, shows p-value > 0.05, there is no significant difference in pre- test PCS scores between

the experimental and the control groups .So we can consider the groups as homogenous in the baseline level.

COMPARISON OF POST TEST PCS SCORE GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUP

Table 20- shows independent t test for post test PCS score between group A (experimental group) and group B (control group)

Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	0.90	0.07	0.06	16	1.42	14	0.17
Post- test	O.84	0.09					

The Mean column in the t test table displays the mean post-test PCS scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.06) shows the difference between mean in two groups (0.90and0.84). Since the t-value, 1.42 shows p-value > 0.05, there is no significant difference in post-test PCS score between the experimental and the control groups.

COMPARISON OF PRE TEST POST TEST PCS SCORES BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUP

Table 21 – shows comparison of pre test post test PCS in group A (experimental group)and group B(controlgroup)

Group	Pre test mean	SD	Post test mean	SD
Experimental	0.79	0.103	0.90	0.078
Control	0.82	0.09	0.84	0.090
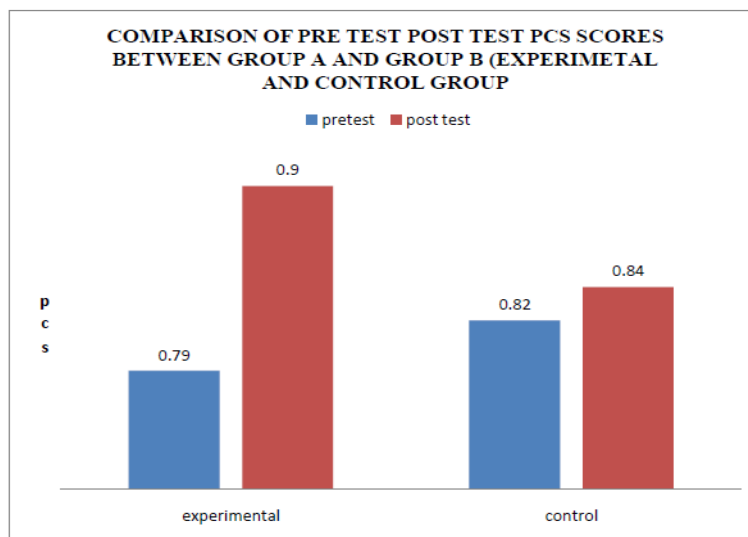
Graph.6- graphical representation of comparison of pre test post test PCS in group A (experimental group) and group B (control group)

COMPARISON OF PRE TEST MCS SCORE BETWEEN GROUP AAND GROUP B (EXPERIMETAL AND CONTROL GROUPS)

Table 22 – shows independent t test for pre test MCS between groupA (experimental group) and group B (control group)

| Test	Mean	SD	Mean improvement	n	t	df	p value
Pre- test	0.767	0.09	0.007	16	0.14	14	0.88
Post- test	0.760	0.09					

The Mean column in the t test table displays the mean pre-test MCS scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.007) shows the difference between mean in two groups (0.767and 0.760).Since the t-value 0.14, shows p-value > 0.05, there is no significant difference in pre-test MCS scores between

the experimental and the control groups .So we can consider the groups as homogenous in the baseline level.

COMPARISON OF POST TEST MCS SCORE GROUP A AND GROUPB (EXPERIMETAL AND CONTROL GROUP)

Table 23 – shows independent t test for post test MCS between group a (experimental group) and group B (control group)

Test	Mean	SD	Mean Improvement	n	T	df	p value
Pre- test	0.87	0.044	0.106	16	3.005	14	P<0.05
Post- test	O.772	0.089					

The Mean column in the t test table displays the mean post-test mcs scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (0.106) shows the difference between mean in two groups (0.87and0.772).Since the t-value, 3.005 shows p-value < 0.05, there is significant difference in post- test MCS score between the experimental and the control groups. The scores in the experimental group is significantly higher than that in the control group Hence Buteyko breathing technique is effective in MCS among college students.

COMPARISON OF PRE TEST POST TEST MCS SCORES BETWEEN GROUP A AND GROUP B (EXPERIMETAL AND CONTROL GROUP)

Table 24- shows comparison of pre test post test MCS in group A And group B

Group	Pre test mean	SD	Post test mean	SD
Experimental	0.76	0.09	0.87	0.04
Control	0.76	0.09	0.77	0.089
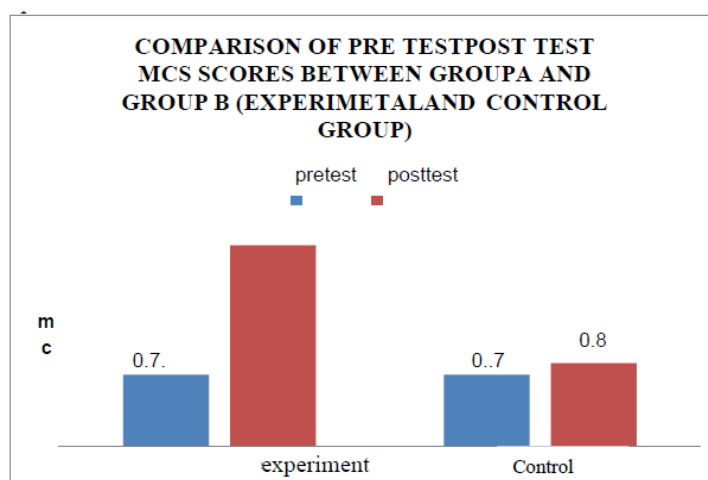
Graph 7 graphical representation of comparison of pre test post test MCS in group A (experimental) and group B (control group)

DISCUSSION

Test anxiety is a psychological condition in which individuals experience distress and anxiety in testing circumstance. It is a form of performance anxiety. Fear of exam can influence the academic performance of the students and it can also leads to avoidance of feared situations. Test anxiety can have broader consequences, negatively affecting a student's social, emotional and behavioural development.

Nisha Pagaria, 2020 (13) conducted a study on-Exam anxiety in college students' and concluded that there is significant level of test anxiety among college students and females have high level of test anxiety than male. Test anxiety can lead to depression, stress and may lead to student parental conflict. All these point out

the importance of reducing test anxiety in student's academic performance. To that end the investigator choose college students and reducing their test anxiety using Buteyko breathing technique.

The west Side Test anxiety Questionnaire was used to identify test anxiety. It consisted of ten brief items and it is measured in five points Likert scale. Total score was divided by ten to obtain the mean value in which a mean score of less than 3 was considered as normal or low anxiety whereas mean score of more than 3 showed test anxiety.

The Reliability and Factor Structure of the Westside Test Anxiety Scale among University Students was validated by comparing fifth graders and college-aged students, and found to have a Pearson r = 0.44. The scale has also demonstrated internal consistency in a study comparing different types of education styles.

A total of 16 students were selected from Medical Trust Institute Of Medical Science, Kochi and KVM College Of Nursing, Cherthala, on the basis of inclusion and exclusion criteria. They were divided in to two groups, group A and group B using simple randomization method. Group A received both Buteyko breathing technique and Anulom vilom pranayama whereas group B received Anulom vilom pranayama Pre and post measurements were done before and after the intervention.

The outcome measures used were west side test anxiety scale, pulmonary function test, SF36 questionnaire. The results were analysed using t – test. Paired t test was use to compare the results within the group and independent t test was used to compare the results between the group. Significance level is kept as p value <0.05.

The result in case of the test anxiety, has shown that in paired t test, since the t-value, 6.7 shows $p < 0.01$, there is a significant difference existing between the pre- test and post-test test anxiety scores in group A(experimental group). The t-value, 3.44 shows $p < 0.05$, there is a significant difference existing between the pre-test and

post-test test anxiety scores in group B(control group) also. The results showed reduction in both groups. In the independent t test, since the t value 4.67, shows p- value < 0.001, (p=0.0003) there is a significant difference in post-test anxiety scores between the experimental and the control groups. The mean difference, 0.51 shows the difference between mean in two groups group A(2.26) & group B (2.775) respectively. The scores in the experimental group were significantly higher than that of the control group.

The intervention targeted mainly on test anxiety which affects negatively on students' academic performance. The result shows significant reduction in test anxiety as evidence shows that the practice of reduced breathing exercises which modify carbon dioxide tolerance are therapeutic to those who suffer from anxiety, panic attacks and depression. The technique of observing and slowing down the breath has been shown to calm the mind and improve resilience in stressful situations. Practicing breathing exercises that create a slight accumulation of carbon dioxide conditions the brain to tolerate higher concentrations of the gas. Gently subjecting the body to the feeling of air hunger for short periods of time will also reduce the body's fear response, reducing the risk of panic and hyperventilation. After all, the sensation of air hunger is a natural occurrence that we experience several times a day, especially during physical exercise, and there is no need for the body to respond to the feeling with panic.

The result goes in hand with Ravinder Jerath, et al. (2015) who concluded that breathing techniques could be used in supplemental treatments for stress, anxiety, depression and some emotional disorders.(14)

The result in case of the FEV1, has shown that in paired t test, since the t- value, 1.56 shows p >0.05, there is no significant difference existing between the pre-test and post-test FEV1 scores in group A(experimental group). The t- value, 1.52

shows p > 0.05, there is no significant difference existing between the pre-test and post-test FEV1 scores in group B (control group) also. The results show improvement in both groups. In the independent t test, since the t value 1.08, shows p-value >,0.05(p=0.29) there is no significant difference in post-test FEV1 scores between the group A (experimental) and group B (control group). The mean difference, 0.16 shows the difference between mean in two groups group A(1.16) & group B(1.00) respectively.

In this study there is no significant improvement of FEV1. This could be explained as probably a large sample size would have bought a significant difference in FEV1. Furthermore , the duration of the study was 4 weeks which was probably not sufficient to provide a significant improvement in FEV1and the study was conducted through goggle meet ,if there were direct interaction with the subjects this would have bought a significant difference.

The result in case of the PCS, has shown that in paired t test, since the t- value, 4.21 shows p <0.01, there is significant difference existing between the pre-test and post- test PCS scores in group A(experimental group). The t-value, 4.14 shows p < 0.01, there is significant difference existing between the pre-test and post-test PCS scores in group B (control group)also. The results showed improvement in both groups. In the independent t test, since the t value 1.42, shows p- value,>0.05(p=0.29) there is no significant difference in post-test PCS scores between group A(experimental)and group B(control groups). The mean difference, 0.06 shows the difference between mean in two groups group A(0.90)& group B (0.84)respectively.

In this study there is no significant improvement of PCS. This could be explained as probably a large sample size would have bought a significant difference in PCS. Furthermore , the duration of the study was 4 weeks which was probably not sufficient to provide a significant improvement in PCS and the study was conducted through Google meet , if there were direct interaction with the subjects this would have bought a significant difference.

In case of the MCS, it was found that in paired t test, since the t-value, 4.69 shows p <0.01, there is significant difference existing between the pre-test and post-test MCS scores in group A(experimental group). The t-value, 2.63 shows p < 0.01, there is significant difference existing between the pre-test and post- test MCS scores in group B (control group) also. The results showed improvement in both groups. In the independent t test, since the t value 3.00, shows p-value,<0.01(p=0.009) there is significant difference in post test MCS scores between the experimental and the control groups. The mean difference, 0.106 shows the difference between mean in two groups 0.87& 0.77respectively. The scores in the experimental group were significantly higher than that of the control group.

The result shows significant improvement in MCS, The improvement of quality of life in the Buteyko group could be a result of improvement in hidden hyperventilation as claimed by Buteyko. The reasons for the improvement in quality of life are due to the Buteyko breathing technique involving a period of breath holding interspersed with periods of shallow breathing, accompanied by physical activities to increase the build up of CO_2. Thus it reduces stress, anxiety and panic attacks thereby contributing to improvement in quality of life. The result goes in hand with Eva Lenart et al. 2020, who concluded that breathing exercise have greater potential in improving quality of life in adults.

Figure 12; Answering west side anxiety questionnaire

Fig:13-Anulom vilom pranayama

fig:14-Anulom vilom pranayama

Figure 15 ; Pulmonary function test

fig:16-Butyeko breathing technique

Strength Of The Study

- Number of participants was equal in both groups
- Participants independently committed to the exercise sessions and were regularly present in goggle meet session
- Cost effective programme
- Can be performed any were without any barrier

Limitations Of The Study

- As the measurements were taken manually, this may introduce human error, which could threat the reliability of the study.
- Exercise sessions were conducted through goggle meet
- Both genders were included which may affect the outcome measures.

Future Research

- The sample size of the study can be increased; hence it may lead to better results.
- The treatment duration of the study can be increased.
- Can be administered in school students and other educational field
- A follow-up study could ensure the long-term effect of the treatment programme.

CONCLUSION

From the above study it was obtained that there is significant difference among the experimental group and control group when the values were analysed. The study concluded that the analysis of test anxiety, PFT and SF36 shows improvement within the group and between the groups. But the experimental group shows significant higher improvement in two parameters (test anxiety, MCS score) when compared to control group.

Hence the main aim of the study was to reduce test anxiety, Buteyko breathing along with Anulom vilom pranayama technique is effective in test anxiety among college students.

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