

Effect of anapanasati meditation on anxiety: a randomized control trial

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KEY WORDS

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ABSTRACT

Background: Meditation has shown positive results in improving the psychological disorders such as anxiety. There is a need to study the therapeutic benefits of Anapanasati meditation, a mindfulness meditation technique.

Purpose: The study aims at investigating the effect of Anapanasati meditation on individuals with moderate anxiety.

Methods: A total of 112 participants who were willing to participate in the study were recruited for the study. Anapanasati meditation was used as an intervention. The participants were divided into two groups experiment and control groups. Experiment group had 56 persons performing Anapanasati meditation and Control group had 56 persons not performing any type of meditation. The experiment group practiced one hour of Anapanasati meditation daily under the supervision of experts for six months and continued their daily routine and control group was not given any intervention, but they continued their daily routine. State Trait Anxiety Inventory (STAI) is used to assess the anxiety level.

Results: The STAI score before and after Anapanasati meditation was analysed for both experiment and control groups using Paired Samples T test. The experiment group has shown significant reduction in the STAI ($P < 0.05$) score after the intervention whereas in the control group the reduction in STAI score was not significant.

Conclusion: This study has shown that after six months of intervention, the subjects with moderate anxiety who practiced Anapanasati meditation had a significant decrease in their STAI score and the control group has not shown significant change in the STAI score.

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Introduction

Anxiety is an emotional state such as nervousness, tension, worry or apprehension which a person perceives for various reasons [1]. The research indicates that anxiety is closely associated to chronic allergy such as asthma, cognitive impairment and dementia and many other chronic diseases such as rheumatology [2–4]. Preoperative anxiety is commonly experienced by the patients waiting for surgery and in a study authors suggested that listening to Tibetan music helps in managing the preoperative levels [5]. The quality of life of the individuals with chronic illness varies with comorbid anxiety which emphasizes the importance of reducing the anxiety levels [6]. Number of scales were developed for measuring anxiety levels and State Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI) and Hospital Anxiety And Depression Scale-Anxiety (HADS-A) are widely used in assessing the anxiety levels in research and clinical studies [4].

Meditation is a set of self-regulatory practices [7] or psychosomatic practices [8] with a focus on training the attention and awareness such that concentration will be developed. It is well known that meditation, one of the limbs of Patanjali Yoga [9], plays a significant role in improving the psychological disorders and research suggests the use of mindfulness

meditation for reducing depression and anxiety levels [10–12]. Recently there has been increasing research interest on therapeutic benefits of meditation for psychological disorders and studies on meditation have shown significant positive results in psychological disorders [11,13–16]. Despite the therapeutic benefits of meditation, there are considerable discrepancies on the effect of meditation on brain as studied by Electroencephalogram [17].

The earlier studies have considered different meditation techniques but there were no studies done with Anapanasati meditation, a form of Mindfulness meditation. Anapanasati meditation is the name of the meditation practice adopted by Gautam Buddha and it is nothing but mere observation of one's own breath i.e., inhaling and exhaling [18]. In this study we aimed at studying the effect of Anapanasati meditation on the individuals with moderate anxiety assessed with State Trait Anxiety Inventory scale.

Methods

Subjects

The subjects were selected from Pyramid Valley International Bangalore and Pyramid Spiritual Science Academy, Koramangala, Bangalore. A total of 112 subjects who were

willing to participate in the study were selected for the study. The age group ranged between 20 and 65 years.

Inclusion Criteria

Males and females within the age group of 20 to 65 years were included in the study.

Exclusion Criteria

Individuals who have been diagnosed with diabetes, cancer, hypertension were excluded from the study.

Design

This is a prospective random control design. The participants were divided into two groups experiment and control. The subjects selected for study were randomly allotted into two groups by using random number generator program. A total of 56 participants were included in experiment group and 56 participants were included in control group. The invigilators coded and saved the answered questionnaires after the study. A person not involved in group formation evaluated the coded answer sheets. A person who was not involved in this study decoded the answer sheets only after noting the scores before and after data was completed.

State Trait Anxiety Inventory (STAI) [1], a self-report questionnaire is used as the scale to study the effect of intervention. STAI consists of two parts state anxiety and trait anxiety each consisting of 20 questions which takes values from 1 to 4. We have considered state anxiety part (STAI-S) of the questionnaire for our study which indicates the current state of anxiety in a specific situation when compared to trait anxiety which is a general tendency of the individual. The score can range from 20 to 80 and the score increases with anxiety levels [1]. The score greater than 40 is considered to be clinically significant score for STAI scale [4,5]. The subjects were asked to read each statement and select the statement which reflects the true state of the individual at that moment. The informed consent was taken from all the participants who were willing to participate in the study.

Intervention

Anapanasati Meditation is given as intervention to participants in the experiment group and participants were asked to practice meditation daily one hour along with their routine duties and there was no intervention to Control Group but they were asked to continue their daily routine. The Meditation classes were conducted six days a week for six months under the supervision of experts. It was ensured that there was no interaction between the groups during the entire period of six months. The tests were administered on the first and last day of the study. The subjects were accommodated at a quiet environment free from distractions to fill up the questionnaires. The subjects were asked to fill up the questionnaires with experts present for any clarification and without consulting other subject while filling up the questionnaire.

Statistical Analysis

The data were analysed using SPSS Statistics Version 10. The data was presented as mean \pm standard deviation. The data was assessed for normality using Kolmogorov-Smirnov test and STAI score was found to be normal in both experimental and control groups. P value <0.05 is considered statistically significant for all comparisons and the data were reported to two significant figures. The statistical tests used were Paired Samples t-test for pre-post comparison within the groups. The Cohen's d effect size for assessing the effect of intervention was computed as the ratio of the difference between means of experiment and control groups to the pooled standard deviation.

Results

The STAI score before and after the Anapanasati intervention was analysed for both Experiment and Control groups using Paired Samples T test as shown in Table 1. The experiment group has shown significant reduction in the STAI ($P < 0.05$) score after the intervention whereas STAI score has increased in the control group. The pre and post STAI scores across age groups of Experiment and Control groups were tabulated in Table 2. The Cohen's d effect size was computed and it has taken a value of 1.52.

Table 1: Paired Samples T Test

Group N	STAI (Pre)	STAI (Post)	P Value	CI
Experiment	5648.32 \pm 6.57	45.73 \pm 3.28	0.01*	[0.59, 4.58]
Control	5650.45 \pm 4.55	51.93 \pm 4.76	0.01*	[-2.61, -0.353]

Data is represented as mean \pm standard deviation

STAI: State Trait Anxiety Inventory

N: Number of Participants

Pre: Pre data taken before intervention

Post: Post data taken after intervention

*P Value significance at 0.05 level

CI: 95% Confidence Interval of the difference between pre and post BDI scores

Table 2: STAI vs Age in Experiment and Control Groups

Age Group	Experiment Group			Control Group		
	STAI Pre	STAI Post	P Value	STAI Pre	STAI post	P Value
≤ 40	44.0 ± 5.03	45.14 ± 3.44	0.625	50.44 ± 4.22	52.22 ± 4.43	0.03*
> 40	49.44 ± 6.56	45.85 ± 2.75	0.004*	49.44 ± 5.09	51.69 ± 6.03	0.17

Data is represented as mean ± standard deviation

STAI: State Trait Anxiety Inventory Score

Pre: STAI score before intervention

Post: STAI score after intervention

*P Value significance at 0.05 level

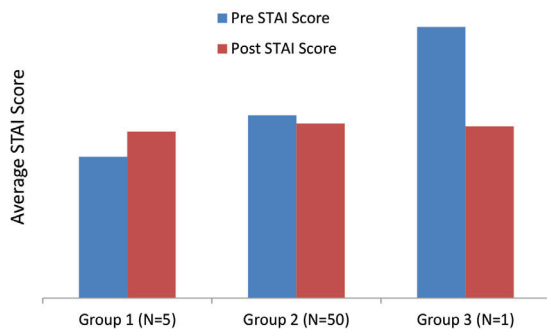


Fig. 1: Comparing Pre and Post STAI Score across three different ranges of score in experiment group.

Group 1: Participants in experiment group with STAI score less than 40

Group 2: Participants in experiment group with STAI score between 40 and 60

Group 3: Participants in experiment group with STAI score greater than 60

Discussion

The present study focused on investigating the effect of Anapanasati meditation on the individuals with moderate anxiety and STAI scale was used for assessing the anxiety level. STAI scale is considered to be one of the best measures and literature review indicates that the number of citations with STAI are more compared to other measures and originally the scale was designed for normal population which was extended later for clinical studies [1]. In the present study at the end of the six month period we have observed that the anxiety levels of the subjects in Experiment group have reduced significantly whereas in Control group the anxiety levels have moderately increased. The previous studies on Anapanasati meditation have shown that the stress parameter activation coefficient and health parameter integral area as measured by Electro Photonic Imaging (EPI) technique have reduced significantly with meditation [19] and also Anapanasati meditation was closely associated to attention task performance [20]. The earlier studies on mindfulness meditation established the effectiveness of meditation in reducing the anxiety and depression levels [13,21–24] and our results with Anapanasati meditation, a form of mindfulness meditation, match with the

results of the previous studies. The role of yoga in improving the quality of life which gets influenced by negative emotions and aggression is well understood [25–27] and meditation being a limb of Yoga [9] has a significant role in improving the quality of life and reducing the anxiety and depression levels. The results of our study highlight the importance of meditation in reducing the anxiety levels as measured by STAI.

We further analysed the data and observed that after practicing Anapanasati meditation for six months the anxiety has come down in older subjects with age greater than 40 whereas the anxiety has increased in younger subjects with age less than 40. The reason for such an increase in STAI score in younger adults may due to lower sample size of younger group which has only 7 subjects and warrants further focussed study to establish the effectiveness across different age groups. The STAI score was lying between 40 to 60 for majority of the participants in both experiment and control groups. In experiment group there were only 5 subjects with less than 40 and only one subject with score greater than 60 (Fig 1). The STAI score has moderately increased in the subjects who were having the score less than 40 after intervention and the reason for such an increase need to be understood from various factors such as physiological, psychological and socio-economic status of the individuals and not considering them in our study is a limitation. The results of the current study confirm the effectiveness of Anapanasati meditation but warrants further in depth study to understand the effectiveness when anxiety is comorbid with other physiological and psychological disorders.

This is the first time the effect of Anapanasati meditation on anxiety was studied and the results were promising and paved the way for in-depth studies to unravel the hidden potential of the meditation. The study has been done with equal sample size in both the groups and the baseline score of both the groups is nearly same which is the strength of the study. Despite the promising results there are many limitations in the study which need to be addressed in future studies. The study was done with moderately smaller sample size and there is a need to do the study with larger sample size covering all age groups. The STAI score was not covering the low, moderate and high levels as majority of the participants were in moderate group. There is a need to study the effect of Anapanasati meditation with larger sample size covering the range of STAI score such that the effect of meditation at various levels of anxiety can be studied. The results confirm that Anapanasati

meditation has reduced the STAI scores when compared to control group who were not performing any meditation but due to the lack of physiological, psychological and socio-economic status of the participants it is difficult to understand the reasons why the anxiety levels have increased in the participants of control group. We have not measured general anthropometric and clinical parameters such as height, weight, blood pressure, pulse rate etc. and hence study lacks the strength in assessing the therapeutic benefits of the intervention.

Conclusion

In conclusion, the participants of Anapanasati meditation have shown significant reduction in the anxiety score measured with State Trait Anxiety Inventory. There was no such significant change in the STAI score of control group. Anapanasati meditation is a form of mindfulness meditation and the results emphasize the need for its regular practice in improving the quality of life.

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Authorship contribution

This article complies with International Committee of Medical Journal editor's uniform requirements for manuscript.

Ethical statement

Signed informed consent was obtained from all the subjects. The institutional ethical committee of the parent institution had cleared the project proposal with ethical approval number IEC/Vyasa/24/2014.

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Conflict of interest

None

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