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Impact of Pranakarshan Pranayam on Anxiety: An Empirical Query

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Impact of pranakarshan pranayam on anxiety along with two anxiety related parameters -galvanic skin resistance (GSR) and alpha-electroencephalogram (EEG) was investigated in order to assess its efficacy as an inexpensive therapeutic technique. A sample of 68 participants (40 to 60 years of age) was drawn from the regular visiting devotees of Shantikunj, Hardwar (India). These participants were divided into two groups (experimental and control) through randomization. Both groups consisted of 34 subjects each. Experimental group was subjected to regular half an hour practice of paranayam for the period of three months. Sinha's comprehensive anxiety test was used to measure anxiety. Galvanic skin resistance (GSR) and alpha EEG (electroencephalogram) brain waves were also investigated for the validation of results. Data was analysed by using student t-test. Clinically significant results were found at .01 levels. Results imply that pranakarshan pranayam can be very effective as a therapeutic technique against anxiety.

Keywords: Pranakarshan pranayam, Anxiety, Galvanic skin resistance, Alpha brain waves

Anxiety is a psychic condition of heightened sensitivity to some perceived threat, risk, peril or danger. It is an emotion characterized by apprehension and anticipation of future danger or misfortune accompanied by a feeling of dysphoria or somatic symptoms of tension (American Psychiatric Association 2000). The perceived danger may be either an internal or an external fear. The physiological manifestation of anxiety such as elevated blood pressure, cardiac discomfort (e.g. palpitations, tachycardia etc Gorman, Fyer, & Gliklich, 1981), diaphoresis, dizziness, dry mouth, irregularities in breathing (hyperventilation), musculoskeletal disturbances (e.g. restlessness, tremors, weakness) may present as symptom of activation of the autonomic nervous system. Anxiety is a normal reaction to a situation where immediate danger exists and may result in physical harm (Goldstein, 1940). Anxiety is also a normal response to situation that poses a threat to self-esteem or psychological well being (LeDoux 2000). Pathological anxiety occurs in situations where there is no real physical or psychological danger or when the emotional reaction is disproportionate in intensity to the actual danger (Spielberger & Rickman, 1990). Beck, Laude, and Bohnert (1974) believed that anxiety results from a misperception of danger or an unrealistic heightened expectation of harm. The degree of the anxiety is directly proportional to the anticipated severity of the adversity and the degree to which the individual cognitively distorts this fears. Whatever the theorists may say about anxiety, but all are convinced that

apprehension and anticipation of future danger and somatic symptoms of tension are inevitably involved in it.

Now a day, nobody is abstained or refrained from the negative effects of anxiety. It is not only influencing the people of all age range who are known to be burdened with lot of responsibilities in different dimensions of their life but also affecting even children, teenagers and aged. To get rid of it people are becoming drug addicts, alcohol dependent and chain smokers (Ponnuduri, Somasundaram, Indira, & Gunasekar, 1984; Channabasavanna, Michael & Murli, 1985; Mehta, Joseph, & Verghese, 1985). Use of such substances leads them to an altered state of consciousness in which they feel relaxed but become unaware about their reality. Ultimately it ruins their health in every aspect (physical, mental, and spiritual) of it.

So there is a strong need to find out an effective solution for it. Several attempts have been made in this regard in terms of scientific research. Various drugs and techniques have been discovered and designed but their treatment approaches have been found to be one-dimensional or otherwise unholistic. Some drugs are used to reduce anxiety but can have several unhealthy side effects. Some psychological techniques are found easy to follow but their therapeutic efficacies may not be long term in nature. Some techniques which are considered to be effective are mostly economically expensive and demand lot of expertise, training and competencies. In this respect there is a need to find out a holistic approach which would be simultaneously therapeutically effective, inexpensive and easy to follow; which could be easily incorporated by the people of every age in their daily routine of life and has at least dual ability of influencing the psychological and physiological response of anxiety affected person in terms of enhancing relaxation and positive well being.

Anxiety is an emotional consequence of stress and several studies have been shown the potentially effective strength of yogic techniques in reducing physiological and psychological signs (Everly, 1989) of stress both in normal persons (Telles, Nagarathna, Nagendra & Desiraju, 1993) and in those with abnormally high level of stress (Raghuraj & Telles, 1997). It would be a better proposition to find or design anxiety relief technique based upon ancient text or presently available yoga scriptures. As mentioned earlier, anxiety is a kind of mental tendency characterized by unstoppable continuous reoccurring apprehensive negative thoughts along with its physiological responses such as heightened arousal level, increased rate of heartbeat and respiration. So before making attempt to completely extinct anxiety from its roots, first it would be necessary to inhibit the continuously reoccurring apprehensive negative thoughts.

Further, by regulating heightened arousal level, increased rate of heart beat and respiration, anxiety responses could be prevented. It has now been proved that breathing pattern and respiration rate are related to emotional state of a person. If by any means respiration rate could be controlled then consequently feeling of anxiety could be controlled. In this regard, technique of pranayam may be assumed to be appropriate since it could regulate the respiration. According to Maharishi Patanjali -*"Tasminsati swanspraswansyorgativixedah pranayamah"* (Patanjali yoga darshan, 2/49) means controlling procedure of the natural rate of respiration and extension of breathing duration is called "*pranayam"*. Apart from it, to replace negative thoughts associated with anxiety, feeling clarity in thoughts is required. This comes through the awakening of *'viveka'* - an ability to make disctinction between right and wrong, good and bad, appropriateness and inappropriateness. *Viveka* could be achieved by practice of pranayam.

According to Maharishi Patanjali – *"Tatahxiyateprakashavarnam"* (Patanjal yoga darshan, 2/52) - means practice of pranayam facilitates awakening of *viveka* by removing the sheaths of *panchklehsa*s over the *chitta* (mind). *Avidya* (ignorance), *Asmita* (ego-Identity), *Raga* (attachment), *Dwesha* (jealousy) and *Abhinvesha* (fear of death or threat to one's existence) are described as *panchklesha*s.

We assume that "*Pranakarshan"* pranayam technique would be appropriate for the management of anxiety because in this procedure, desire, feeling and sankalpa (willpower) are involved along with the regulation of respiration rate. It has the strength of auto suggestion and cognitive restructuring in psychological view. In all pranayams, there is controlled regulation of breathing. But in Pranakarshan Pranayam, alongwith controlled breathing, there is cognitive restructuring and mental imagery. Mental imagery is quasi-perceptual conscious experience (Thomas, 2005). This is an integral part of Pranakarshan Pranayam, which we can understand, when we go thorough its procedure.This pranayam technique was specifically designed by Pandit Shri Ram Sharma Acharya who was the founder of Shantikunj and Brahamvarchas Research Centre, Haridwar, India. According to him, the success of pranakarshan pranayam depends upon the degree of sankalp shakti (willpower) used by its practitioner. The practice method of this pranayam is very easy to follow.

Procedure for* Pranakarshan Pranayam*:

The developer of this pranayam Pandit Shri Acharya has advocated the following simple steps for practice-

I. In the early pre dawn hours after performing daily ablutions sit cross legged facing the eastern direction. Place both hands on the knees. Close your eyes. Meditate on the fact that in the entire sky Prana (vital force of life) is full of light and energy pervades it. Prana akin to clouds of hot steam shining in sun light are flowing towards us from all directions. And within this Prana we are seated contentedly, peacefully and joyfully.

II. From both nostrils start inhaling and meditate on the fact that we are imbibing within the body clouds of Prana principle. Just as a bird and snake enter their nest and hole in the same way scattered Prana flow around us is entering our body via the nose. Thus it is also entering our brain, chest, heart, stomach and all other organs.

III. When you inhale deeply stop it from getting exhaled for sometime and feel mentally: "The Prana I have inhaled is now pervading every pore of my body. Just as when we pour water on mud it soaks the water so too our bodily parts are like dry mud and water as Prana is being soaked by our entire body. Further our body is also fully imbibing consciousness, divine light, strength, zest, enterprise, patience and valor that are conjoined to Prana".

IV. Try and stop exhalation (after inhaling air) as much as you are comfortable and then slowly exhale this air. At that time mentally think: "After imbibing the essence of Prana in every pore of our body dirty air is being emitted out of our body. It is like throwing away remnants after butter is churned from buttermilk. All mental taints and distortions are being emitted via exhalation of this air and like black smoke it is throwing out all unwholesome imprints of the psyche".

V. After exhaling fully let the air remain outside for sometime i.e. life without air for sometime and think: "Since all the taints of my mind have been exhaled I will shut all doors on them. Now these distortions have run away miles from me".

This cycle has to be repeated again and again, approximately for thirty minutes. Since each cycle will be around of three minutes, within half an hour, an individual can complete

almost ten cycles. However, since enough scientific research has not been carried out on this pranayam before, attempt has been made through the present study so as to test its efficacy in reduction of anxiety. The effect of pranakarshan pranaym on galvanic skin resistance (GSR) and alpha electro encephalogram (EEG) has also been investigated to validate the research findings. Since GSR and EEG brain waves manifest the mental state of a person and relationship of GSR and EEG brain waves with mental states has been already established (Tansey, Michael, Kenneth, Tachiki, and Jennifer 1993) these were included for the validation of the results related to anxiety in the study. The following hypotheses were formulated :

H1. There would be a significant reduction in the level of anxiety in the participants of 'pranakarshan pranayam' group as compared to the participants of 'no pranayam' group.

H2. There would be a significant increase in the galvanic skin resistance of the participants of 'pranakarshan pranayam' group as compared to the participants of 'no pranayam' group.

H3. There would be a significant increase in the alpha EEG brain wave frequencies of the participants of 'pranakarshan pranayam' group as compared to the participants of 'no pranayam' group.

Method

Design:

Experimental group and control group design was followed for this study. The participants were divided in to two equal size matched upon their gender and age; and then randomly assigned to Experimental (Pranakarshn Pranayam group) and Control group (No Pranayam group). Participants of experimental group were subjected to pranayam practice, while those of control group were not asked to do any practice. Pranakarshan pranayam was taken as independent variable and anxiety level as dependent. Ten cycles of pranakarshan pranayam was taken as the level of independent variable. Approximately three minutes were determined for each cycle of pranayam.

Participants:

Sixty eight participants within the age range of 40 to 60 were selected from the regular visiting devotees of Shantikunj Hardwar. Among the participants 40 were male and rest 28 were female. The devotees who have been constantly feeling anxiety for last 15 days were asked to participate in this study for the welfare of mankind and to gain knowledge about a new inexpensive effective anxiety reducing technique. They were explained about the importance of this scientific research work. This motivated them a lot and they voluntarily took part in the study.

Tools:

Sinha's Comprehensive Anxiety Test (SCAT): This tool was used for the measurement of anxiety. It contains 90 items of manifest anxiety. It requires 15 to 20 minutes to fill. Scoring is simple. Percentile norms and categorical norms for interpretation of final score are given. Levels of anxiety are classified in five categories – That is very low anxiety, low anxiety, normal anxiety, high anxiety and very high level of anxiety. The split half reliability coefficient is 0.92 and temporal stability coefficient is 0.85 for this tool. Concurrent validity coefficient is 0.62.

GSR-Biofeedback instrument model no. 'GBF-2000' This instrument was developed by MEDICAID, Chandigarh was used to measure galvanic skin resistance. It shows the skin resistance in numerical units as well as through visual display. It could display the state of anxiety and stress by using three coloured bars of light red yellow and green. Red light bar depicts increasing anxiety while yellow bar shows the normal and green shows the decreasing level of anxiety and stress.

Alpha-EEG bio feedback instrument model no. 'EBF-5000' This instrument was also made by MEDICAID, Chandigarh was used to measure the frequency of alpha waves in hertz. It could display the state of alpha waves in numeric as well as in visual form by using visual display. Electrodes and specifically made gel material are part of it and used.

Procedure:

Step 1 – Participants were invited for voluntary participation in this scientific research. The objectives of the experiment were explained to them.

Step 2 – Sinha's Comprehensive anxiety test was administered to all participants to measure anxiety. Also their frequency of alpha waves and skin resistances were measured by using Alpha EEG and GSR bio-feed back instruments.

Step 3 – Participants were divided in to two equal size matched upon their gender and age. That is why in both the groups there are 20 male and 14 female participants. In both the groups, the participants are almost equally distributed on age varying from 40 to 60 years.

Step 4 – Groups were randomly assigned to 'pranakarshan pranayam' group and 'No pranayam' group.

Step 5 – The experimental group (pranakarshan pranayam group) was exposed to half an hour regular practice of pranakarshan pranayam for three months, whereas the control group was not asked to do any kinds of pranyam practice. Participants of both groups were asked not to have any beverage like alcohol and narcotic drugs which could lose their conscious control. They were also asked not to practice any aerobic exercises, perform *mantra japa* (recitation) and Yagya. Practice of pranakarshan pranayam was done every day in the morning before seven o'clock in the morning.

Step 6 - After three months, the same psychological test and bio feedback instruments were again re-administered to the participants of both the groups to collect the data.

Step 7 – Data was analysed by using student t-test. Mean and Standard deviation of both the groups computed and compared for the test of the significance of the differences between the means of groups.

Results

Mean and standard deviation of anxiety level of the participants of experimental and control group are shown in Table 1. It indicates the effect of pranakarshan pranayam on anxiety level. It shows that difference between the means of both groups was found statistically significant, $t(66) = 9.39$, $p < .01$. On average, as can be seen in Figure 1, pranakarshan pranayam group participants ($M = 24.12$, $SD = 4.42$) got significantly enough reduction in their anxiety level compared to 'no pranayam' group participants ($M = 33.88$, $SD = 4.07$).

Table 1. Comparision of Experimental and Control Group over Anxiety (n=68)

	Mean		SD		t(66)Exp Vs Control (Post Trial)
	Pre	Post	Pre	Post	
Experimental (34)	33.85	24.12	13.09	4.42	9.39**
Control (34)	33.03	33.88	12.63	4.07	

**p< .01

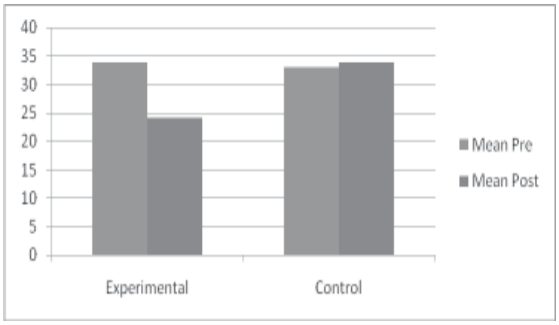

Figure 1. Mean anxiety level comparison in experimental and control group

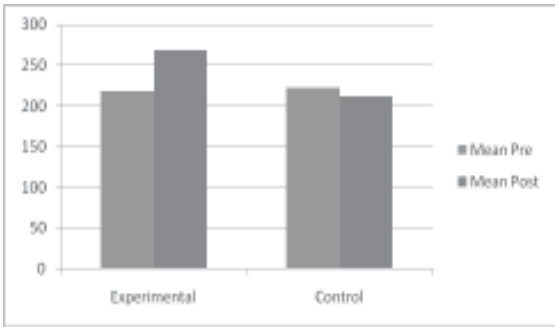

Figure 2. Mean galvanic skin resistance rate comparison between experimental and control group

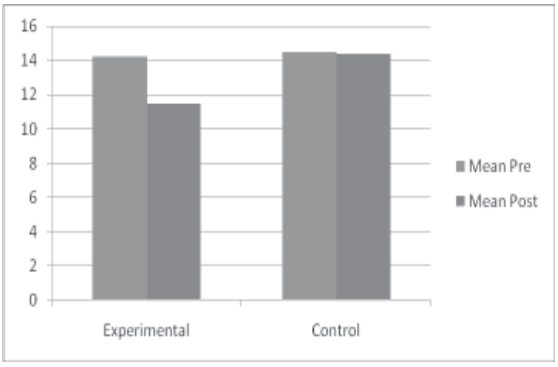

Figure 3. Mean comparison of EEG wave frequency (in hertz) between experimental and control group

Mean and standard deviation of galvanic skin resistance rate of the participants of experimental and control group are shown in Table 2. It indicates the effect of pranakarshan pranayam on GSR. It shows that difference between the means of both groups was found statistically significant, t (66) = 7.60, p < .01. On average, as can be seen in Figure 2, pranakarshan pranayam group participants (M = 268.41, SD = 24.59) got significantly enough improvement in terms of increase in their GSR compared to 'no pranayam' group participants (M = 212.32, SD = 35.28).

Table 2. *Mean, SD of Experimental and Control Group over GSR (Ohms)* (n=68)

	Mean		SD		t(66)Exp Vs Control (Post Trial)
	Pre	Post	Pre	Post	
Experimental (34)	218.56	268.41	38.76	24.59	7.60**
Control (34)	222.38	212.32	37.07	35.28	

**p< .01

Table 3. *Mean, SD of Experimental and Control Group over EEG wave frequency (in hertz)*

	Mean		SD		t(66) Exp Vs Control (Post Trial)
	Pre	Post	Pre	Post	
Experimental (34)	14.23	11.50	2.38	2.01	6.08**
Control (34)	14.50	14.38	2.42	1.89	

**p< .01

Mean and standard deviation of galvanic skin resistance rate of the participants of experimental and control group are shown in Table 3. It indicates the effect of pranakarshan pranayam on frequency of brain waves (in hertz). It shows that difference between the

means of both groups is statistically significant, $t(66) = 7.60$, $p < .01$. On average, as can be seen in Figure 3, pranakarshan pranayam group participants ($M = 11.50$, $SD = 2.01$) got significantly enough improvement in terms of increase in their alpha wave frequency compared to 'no pranayam' group participants($M = 14.38$, $SD = 1.89$)

Discussion

Significant decrease in the anxiety level of the participants of the 'pranakarshan pranayam' group as compared to 'no pranayam' group was found after three month duration of the intervention. Significant improvement in terms of increase in GSR and alpha wave frequency was also found in the participants of pranakarshan pranayam group compared to 'no pranayam' group after the same duration. These results imply that the practice of pranakarshan pranayam could significantly decrease the anxiety level experienced by most of the people and simultaneously increase the galvanic skin resistance and frequency of alpha waves. Anxiety is an abnormal disorder in which there appears continuous fearful flow of irrational negative thoughts. It activates the sympathetic nervous system of the body and increases the arousal level, nervousness, heartbeat and breathing rate. Indirectly we can say they that, if this sympathetic system can be controlled and the bases concerning the irrational thoughts can be modified, anxiety level of any individual can be reduced effectively. We assume that, since Pranakarshan Pranayam involves controlled breathing as well as cognitive imagery, it can take care of sympathetic nervous system as well as sources of distorting thoughts.

Galvanic skin resistance and EEG wave frequencies are known to be related to mood states (especially with the arousal level) of human beings and anxiety is a kind of state of mind in which arousal level goes high. Therefore the improvement in the anxiety level can be interpreted in relation to these parameters also. It is well known that the galvanic skin resistance is inversely proportional to skin conductance. It means as the GSR increases skin conductance decreases. In this study GSR was measured by using GSR bio feedback instrument which is connected to the human body by placing electrodes on any two finger tips apart of two centimetres. Conduction of body current is inhibited only when there is sweetening in the palm. Since the excessive sweetening in the palm without any physical environmental influence is considered as the symptom of anxiety so here in the present study the significant increases in the galvanic skin resistance is indicative of anxiety relief.

Similarly the significant increase in the EEG brain wave frequencies in the participants of pranakarshan pranayam group also implies the same thing. There are mainly four kinds of brain waves- alpha, beta, delta, theta which are seen through electroencephalogram and indicative of different kinds of mental conditions. Among these brain waves alpha wave is a high-amplitude EEG wave with a frequency of 8-12 hertz, characteristic of relaxed wakefulness. This wave, also called alpha rhythm, usually appears when a person's eyes are closed. Beta waves are low-voltage EEG wave with a frequency of 13-30 hertz, usually occurring in a state of arousal. Anxiety is also strongly correlated to arousal. In the condition of anxiety arousal level goes high up and in a relaxed state it goes down. It implies that anxiety can be interpreted in terms of beta wave frequency. In present study results shows that the EEG beta brain waves were present in the participants of both the groups before intervention of pranakarshan pranayam. However after three months, beta waves were present only in the participants of control group whereas high amplitude alpha brain waves with the average frequency of 11.5 hertz were found

in the participants of pranakarshan pranayam group. Therefore It could be concluded that three months practice of pranakarshan pranayam can be applied to the patients of anxiety for anxiety relief and to achieve a state of relaxed wakefulness.

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