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RESEARCH ARTICLE

EFFECT OF CONCENTRATIVE MEDITATION ON REACTION ABILITY

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Abstract

The purpose of the study was to investigate the effect of meditation on reaction ability. Meditation is a practice in which an individual trains the mind or induces a mode of consciousness, either to realize some benefit or as an end in itself. Psychomotor abilities were always considered to be the foundation for technical skill and tactical ability in any given sports. Despite its popularity, little is known about the neural mechanisms by which meditation works, several electroencephalogram (EEG) studies have reported changes in spectral and frequency analysis during meditation inspired by techniques that focus on concentration. FFT (Fast Fourier Transform) was used to analysis investigate the composition of an EEG signal. Since the FFT transforms a signal from the time domain into the frequency domain, frequency distributions of the EEG was observed. With this understanding this research study was conceptualized to investigate effect of concentrative meditation on reaction ability. Fifty students were randomly selected as the subjects for the study. The age of the subjects ranged from 21 to 30 years. The subjects were assigned at random to experimental and control group; each group consisting of twenty five students. The study was conducted for a period of eight weeks. The study examined EEG changes during meditation. The investigational paradigm involved 15-20 minutes of meditation, where the subjects were asked to close their eyes and adopt their normal meditation. Two groups comprising of twenty five subjects each were formed i.e. experimental Group and control group. The experimental group was given meditation in the morning session time and no meditational training was given to control group. Each subject of Experimental group was learning concentrative Meditation. Electroencephalogram (EEG) and psychomotor variables used to collect the data before and after meditational training to measure the effect of meditation. These results suggest that meditation provides no improvement in reaction ability. EEG findings from this study suggest that concentrative meditation techniques improves theta and alpha EEG patterns significantly. Key Words: Reaction Ability, Fast Fourier Transform (FFT) and Electroencephalogram.

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Introduction:-

Meditation is a practice in which an individual trains the mind or induces a mode of consciousness, either to realize some benefit or as an end in itself. Meditation often involves an internal effort to self-regulate the mind. Meditation can help clear the mind and ease many health issues. Too often we take our breath granted. It is clearly connected to our every life force and vitality. Our emotion and our state of mind are also intimately connected to our breath. Psychomotor abilities were always considered to be the foundation for technical skill and tactical ability in any given sports. Despite its popularity, little is known about the neural mechanisms by which meditation works, several electroencephalogram (EEG) studies have reported changes in spectral and frequency analysis during meditation inspired by techniques that focus on concentration. FFT (Fast Fourier Transform) was used to analysis investigate the composition of an EEG signal. Since the FFT transforms a signal from the time domain into the frequencydomain, frequency distributions of the EEG was observed. With this understanding this research study was conceptualized to investigate effect of concentrative meditation on reaction ability.

Methods:-

Fifty students were randomly selected as the subjects for the study. The age of the subjects ranged from 21 to 30 years. The subjects were assigned at random to experimental and control group; each group consisting of twenty five students.

The study was conducted for a period of eight weeks. The present study examined EEG changes during meditation. The investigational paradigm involved 15-20 minutes of meditation, where the subjects were asked to close their eyes and adopt their normal meditation. Two groups comprising of twenty-five subjects each were formed i.e., experimental Group and control group. The experimental group was given meditation in the morning session time and no meditational training was given to control group. Each subject of Experimental group was learning concentrative Meditation.

Procedure:-

Reaction Time Apparatus (MEDICAID RTM-608) for measurement of reaction time. The apparatus was set according to prescribed procedure the detectable screen was fixed in the desire holes which divided the reaction time apparatus into two sides the subject side and the tester's side. The subject sat in a chair on subject side and tester sat on the tester's side. The tester rang the bell, which gave a signal for the subject to press the right or left key as selected by the tester width selector switch. Then the tester pressed one of the short keys giving the required stimulus (light) the start key is a double key which gave the stimulus and also started the chronoscope. As soon as the subject received the light stimulus, he lifted his finger from the right or left key, which stopped the chronoscope and the reaction time to the light stimulus reached and recorded from the chronoscope. Three trails were provided to each subject.

Scoring Three trials were permitted to each subject and the average of the three timings was taken as an individual score.

Collection of Data

Electroencephalogram (EEG) and psychomotor variables used to collect the data before and after meditational training to measure the effect of meditation.

Table 1:- Effect of Meditation on Reaction Time.

Dependent Variable Reaction ability	Sum of Square	df	Mean Square	F	P value
Between	.002	1	.002	.245	.623
Error	.248	40	.006		

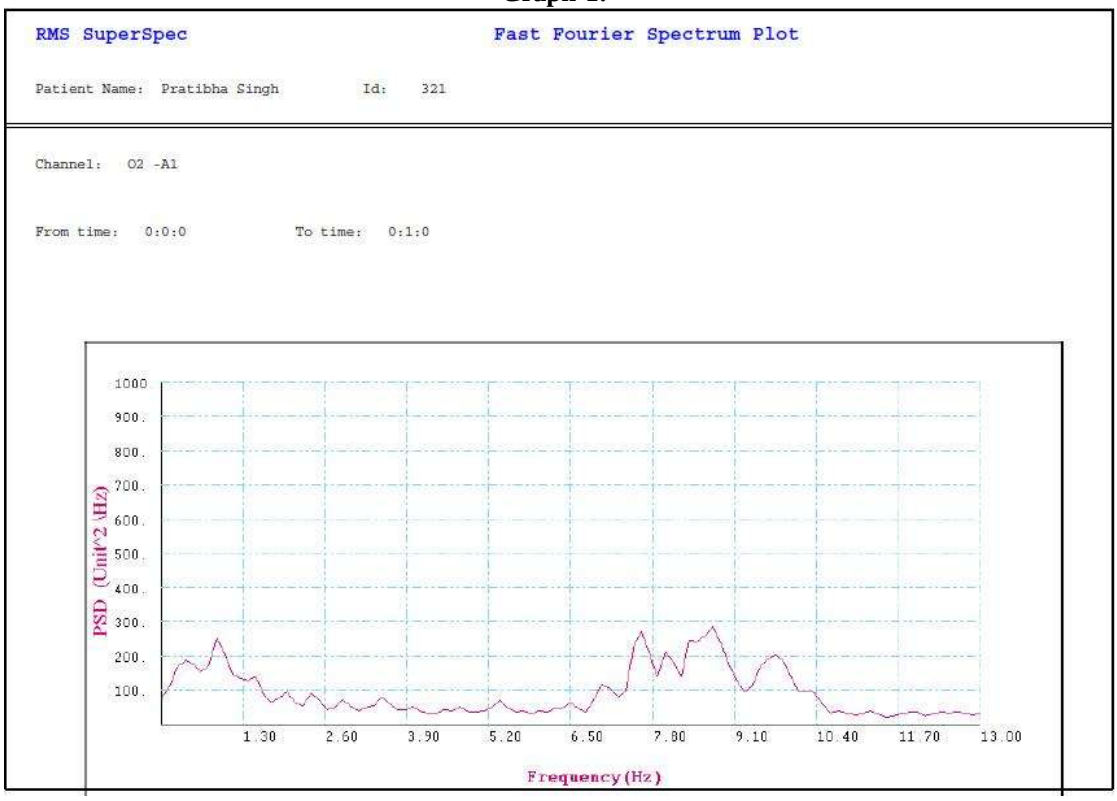
*Significant at 0.05 level

F0.05 (1, 40) = 4.10

Table 1 reveals that there was a insignificant differences was in reaction time variable as calculated value was lesser than tabulated value at 0.05 level of significance with 1,40(df).

The EEG data was analyzed using Fast Fourier Transform (FFT) to determine the power spectrum. The Power Spectrum of EEG is divided into alpha band, beta band, theta band and delta band based on the conventional EEG rhythms, respectively. For each of these bands Power, Peak Frequency and the Peak value corresponding to the peak frequency is calculated. The result was analyzed only on alpha band.

Graph-1:-



The Power

EEG graph is a graph of sine and cosine waves. The power is obtained by calculating the area enveloped by the given spectrum. Since the spectrum is divided into bands on the known EEG rhythms, the area for alpha band only computed. The power is calculated by squaring the amplitude and dividing the same by the frequency. This is represented as µV2/Hz. Although this area or power can be calculated manually, but in the present study calculation was done with the help of Fast Fourier Transformation (FFT) is preferable.

The Peak Frequency

The peak frequency in a band is the frequency that has the maximum amplitude.

The Peak Value

The peak value is the value corresponding to the given peak frequency.

Results:-

Data were analyzed by using analysis of covariance at 0.05 level of significance. The analysis showed insignificant effect in case of reaction ability (.245). On the basis of EEG analyses it reported increase alpha activity in practice meditational group as compared to control group. The findings produced increased occipital alpha power in experimental group than the control group, it also observed in increased theta power across multiple cortical regions.

Discussion Of Findings:-

Robertson (1983) assessed fractionated reaction time for fourteen subjects to determine the short and long time effect on TM on neuromuscular integration. Result indicated no significance immediate pre to post treatment effect. Warshall (1980) found a significant reduction in reflex latency and reflex motor time in TM practitioner, indicating

increased peripheral neurological efficiency. Blackwell at el. (1976), Appelle and Oswald (1974) and Wandhofer and Platting (1973) concluded that the increased alertness developed through meditation resulted in improvement of reaction time.

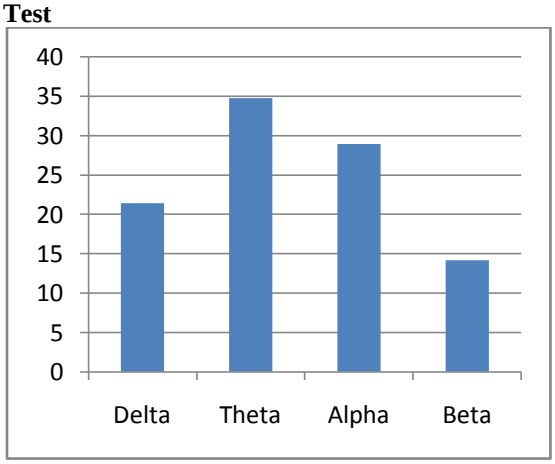
Another study done by A. Malathi, A. Damodaran, N. Shah, G. Krishnamurthy, P. Namjoshi, and S. Ghodke on psycho physiological changes at the time of examination in medical students before and after the practice of yoga and relaxation. Study has significantly attenuated and there was significant improvement in choice reaction time in Group-Y and Group-R as compared to Group-C after yoga and relaxation. Shah and others studied the Effect of yoga on reaction time . result found that insignificant effect after meditation.

The present study showed indicated effect of meditation on reaction ability. The present study did not support the above quoted studies and this may be due to reason that reaction time ability, being one component of speed and less trainable ability of individual and method of training

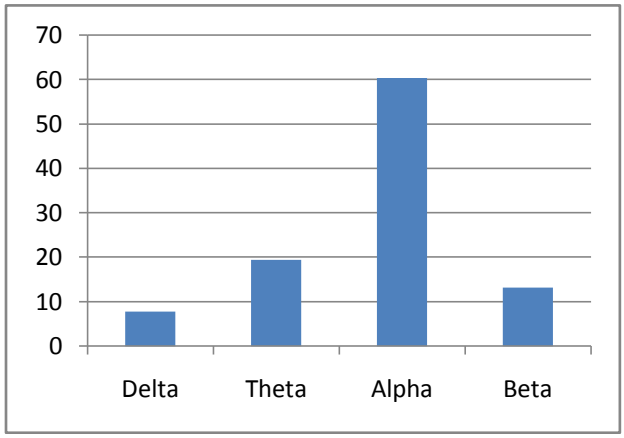
Conclusions:-

These results suggest that meditation provides no improvement in reaction ability. EEG findings from this study suggest that concentrative meditation techniques improves theta and alpha EEG patterns significantly.

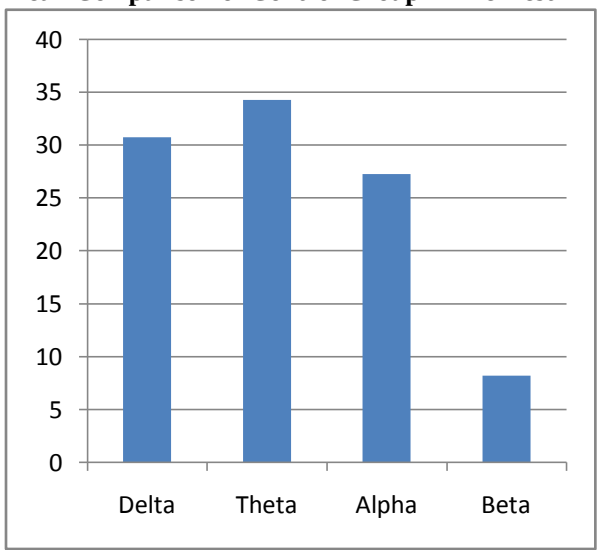
Mean Comparison of Experimental Group in Pre-Test



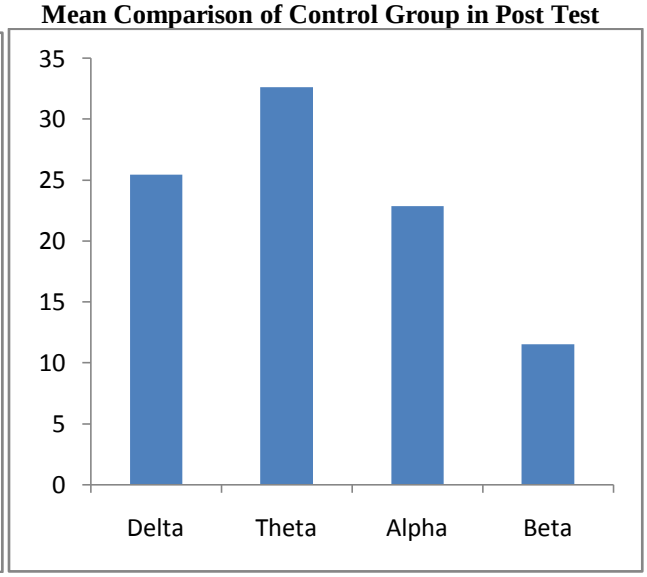
Mean Comparison of Experimental Group in Post Test



Mean Comparison of Control Group in Pre-Test



Mean Comparison of Control Group in Post Test



Discussion of Findings:-

On the findings it produced increased occipital alpha power in experimental group than the control group it also observed in increased delta, theta and alpha power across multiple cortical regions after the meditation. In few studies have reported the findings concerning frequencies during meditation.

Recommendation:-

In the light of conclusions drawn the following recommendation were made:

1. The similar study may be conducted on different psychomotor variables by using EEG.
2. The same study may be conducted on various age groups.
3. The similar study may be conducted by using various meditational techniques such as Zen meditation, transcendental meditation, mindful meditation etc.
4. Correlation analysis may be done with other Bio signals.
5. Different method of signal analysis may be used for information.
6. Different brain waves may be used for further studies

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