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Introduction

Sudarshan Kriya (SK) (a rhythmic breathing process), was devised by Sri Sri Ravi Shankar. The word "Sudarshan" translated from its original sanskrit Su = right, Darshan = vision, "Kriya" means purifying action. This is thus not a pure meditation technique, and has been defined as a state of relaxation by some and a state of consciousness by others. This is practiced as a brief & practical self-help stress-management strategy. Subjective reports from the participants indicate that it reduces anxiety & depression and SK has been found to be useful in the treatment of depression. Various tools have been used to study the effect of relaxing techniques on the mind. These include EEG, evoked potentials (BAER, P300, Middle latency potentials), fMRI, SPECT. EEG has been used to study changes during meditation, and also long-term effect of regular practice of meditation for the past 2-3 decades. During Transcendental Meditation(TM) an increased regularity and amplitude of the alpha activity was noted. The results have been contradictory as different processes produce different changes. The changes observed have been linked to the type of meditation and duration of meditation practice, as subjects varied greatly in their meditation techniques, expertise and their performance. The difference in technique may produce a dichotomy of physiological effects. Most of the physiological research on meditation has been carried out on TM, it is not known whether other stylized practices create the same physiology.

There are no reports at present on changes in EEG and SK. The aim of the present study was to study the sequential changes in EEG, during the SK.

Study Design and Methodology:

Five regular practitioners of SK formed the study group. They were connected with Ved Vignan Maha Vidya Peeth, who regularly practiced and taught SK. They had attended the basic course (22hrs), advanced course (4 days) and the teachers training course. All were females, with a age range from 35-45 years, with similar socioeconomic background and education. None had a psychiatric illness, neurologic illness, and none of the subjects were on chronic medications. All the subjects were asked not to take any central nervous system stimulants/ caffeine prior to the test.

EEG: All recording were done in similar conditions. The

EEG During Sudarshan Kriya: A Quantitative Analysis

subjects were asked to be comfortable, seated on a chair, with their eyes closed. Electrodes were placed according to the 10-20 system of electrode placement; the recording was conducted on a 21 channel digital EEG machine, (Profile, Oxford UK), with AD conversion of 22 bits, and sampling frequency of 256Hz. Filter settings were 0.5- 50Hz, a standard sensitivity of 7 uV/mm and a paper speed of 30 mm/sec. was used for recording the data.

Artifacts free epochs of 6sec. duration were selected at the rest condition, during the Pranayam, Bhastrika and the 3 phases of SK in the first cycle and the 6th cycle, at the end of the SK, and every 5mts after that for 20 minutes. The pruned data was subjected to FFT analysis using MATLAB. The EEG frequency bands were defined as follows: Delta – 0-4 Hz, Theta – 5-7 Hz, alpha – 8-12Hz, Beta 1:13-18 Hz, Beta 2: 19- 30 Hz., and the power calculated in each band and corresponding frequency maps were drawn.

Results:

Coherence: An increase in coherence was observed in the 6th cycle predominantly in the fronto-central regions in the beta band, and posteriorly in the alpha band.

Frequency Analysis: There was an increased alpha activity posteriorly during the SK. In addition a central midline theta activity was observed. The resting EEG demonstrated an increased focal beta activity. GSR- Increase was observed during the SK.

Discussion:

The increased coherence suggests increased connectivity. This is suggestive of more efficient information processing. The central midline theta activity, and increase in GSR suggests activation and the increased alpha is suggestive of relaxation. Thus there is a combination of relaxation and activation during the SK.

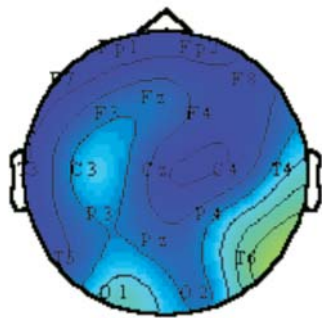
Larger no. of subjects need to be studied to define these changes further.

References:

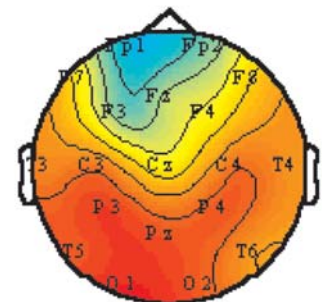
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EEG Performed during and after Sudarshan Kriya

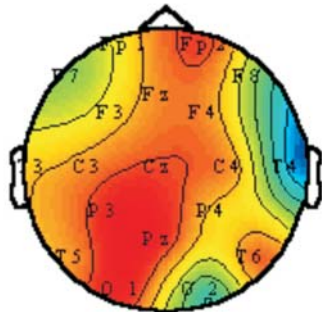
The following are the EEG patterns before starting the Kriya,
during Kriya and after the Kriya.



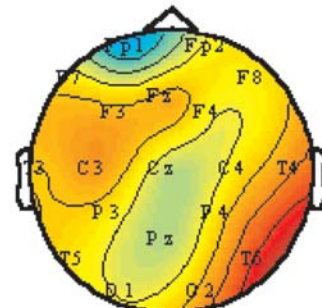
Pre-Kriya



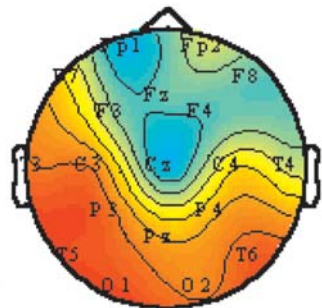
Med-Phase



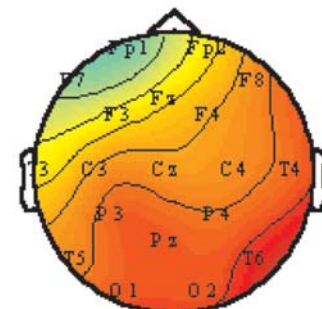
Post-Pranayam



Fast-Phase 7th cycle



Slow Phase 7th cycle



1 Min After kriya



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