Brain Waves: The language of brain function

Neurons communicate with each other using electrical signals and generate Brain Waves measured by EEG.

Different Brain Waves correlate with different states of brain function.

- **Alpha Waves**: Common during rest, relaxed and unfocussed state of mind.
- **Beta Waves**: Common during cognitive decision making & focus.
- **Delta Waves**: Experienced during deep sleep, restorative healing.
- **Gamma Waves**: Experienced during intense focus, love, altruism, higher states.
- **Theta Waves**: Experienced during creativity, intuition, bliss, imagination.
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Study 1: Brain Function of Long Term practitioners

Brain Function was measured during Long SKY at multiple time points for 5 Long term practitioners

Brain function was measured via EEG

**Results**

- ↑β: activity in frontal-central region
- ↑α: activity in posterior region
- ↑θ: activity in central midline region
- ↑: coherence in brain regions

**Interpretation**

- Suggests efficient brain processing
- Suggests relaxation
- Suggests greater awareness, bliss
- Suggests faster information processing between different brain regions

SKY puts the practitioners in a state of relaxed awareness and creates faster information processing in the brain

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Study 2:
Brain Function before and after SKY

Brain Function was measured before and after SKY for 43 (10 long term and 33 recent) practitioners.

Brain function was measured via EEG.

Results

After Sudarshan Kriya the population experienced a change in brain wave pattern:

- 97% people experienced an increase in \( \beta \) wave.
- 84% people experienced an increase in \( \alpha \) wave.
- 100% people experienced an increase in \( \theta \) wave.
- 88.4% people experienced an increase in \( \delta \) wave.

Long term practitioners had a 2-3 fold more increase compared to recent practitioners.

Practioners experienced more energy and alertness after SKY.

SKY creates a state of high awareness, deep relaxation, bliss and creativity, with the effect proportional to practice.
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Study 3: Global Brain Rythm with SKY

Brain Function was measured before and after a single Long SKY for 40 practitioners with >1 year practice

Brain function was measured via EEG

Results

- Overall brain activation
- Activity of all 5 brainwaves
- Interhemispheric synchronisation
- New practitioners saw a shift in $\theta$ $\gamma$ which is quite unusual

Interpretation

Increased connectivity, complexities, & symmetry between the right and left cerebral hemispheres

Increased

- Calm
- Positivity
- Bliss
- Alertness
- Motivation
- Cognition
- Cortical activation
- Attention
- Visual perception
- Long-range neuronal communications

SKY creates a profound global brain activity denoting more energy and communication among different parts of the brain

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Brain Function was measured using P300 amplitude before and after SKY for 24 patients with dysthymia (persistent depression) and 15 healthy controls.

P300 is a specific wave produced during decision making. P300 ERP is lower in depression compared to healthy adults.

**Results**

After Sudarshan Kriya the population with depression experienced a change in P300 ERP brain wave pattern.

**At Baseline**

- Abnormal and lower brain wave patterns: P300 ERP amplitude

**After 90 days**

- Brain wave patterns P300 ERP amplitude became similar to healthy individuals

EEG brain waves that are disturbed during depression sets back to normal rhythm with daily SKY practice, enballing a healthier mental well-being.

SKY practice enables the brain waves disturbed during depression to come back to normal.
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Study 5: Assessment of Resting Brain Function

Resting Brain Function was measured in 19 SKY practitioners and 16 Non-SKY practitioners. Brain function were measured via EEG at resting state.

**Results**

The non-SKY controls were doctors & scientists.

A significant increase in beta activity was observed in various regions of the brain in the SKY practitioners, as compared to the controls.

**Interpretation**

Enhanced Beta activity denotes improved mental focus and heightened awareness.

SKY practitioners displayed significantly greater mental alertness (beta activity) than the control group of physicians and medical researchers, whose profession requires development and daily use of these very skills.

SKY creates enhanced beta activity even at rest among practitioners denoting greater mental focus.

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Working Memory is short term memory to store small amounts of information in the brain, for a brief period, so that we can perform tasks and function.

Chronic Stress reduces Working Memory.

Working memory was tested using computer-based test containing 15 trials, each consisting of remembering & retrieving letters and solving mathematical problems.

Working Memory is critical for mental functioning.
Study 6: SKY and Working Memory

Working memory (WM) and brain signals (EEG) were measured during WM task for 25 people (15 SKY and 10 control) before and after 90 days of SKY.

**Results**

*In SKY group after 90 days of practice*

- **Improvement in Working Memory**
- **Energy losses while performing working memory task**

SKY promotes the efficient use of energy of bands at the desired locations.

Improvements in working memory capacity, as measured by working memory tests, have a role in reducing stress, improving cognition and decision-making abilities.

SKY improves working memory and allows more efficient utilization of mental energy during tasks.
Mental workload refers to the quantum of mental resources required to perform multiple tasks at the same time. Constant high mental workload can cause mental fatigue & reduces productivity.

**Low Workload Task**
A simple task that requires little mental effort

**High Workload Task**
A complex task requiring large mental effort

Brain function (EEG) were measured during high and low mental workload tasks for 25 people (15 SKY and 10 control) before and after 90 days of SKY.

Mental workload capacity is the ability of the brain to process information.

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Study 7: SKY and Mental Workload Capacity

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Study 7: SKY and Mental Workload Capacity

Results Post 90 Days of SKY

**SKY Group**
- Subjective experience of workload reduced
- Task performance improved for both type of tasks
- \( \alpha \beta \) at rest

**Controls**
- Subjective experience of workload reduced slightly for simple tasks but increased for complex tasks
- Task performance decreased for both type of tasks
- \( \alpha \beta \) at rest

SKY improved cognitive flexibility, attentional switching & workload tolerance.
SKY increased \( \alpha \) brain activity in rest conditions, increasing focus and reducing distractions while performing the tasks

SKY improves mental workload capacity and creates relaxed awareness even in situations that require high mental workload
Stress Tolerance
Stress tolerance is the ability to be relaxed and composed when faced with difficulties

Stress Determination Test (DT)
Computer based test
Assess reactive stress tolerance
Requires continuous, brisk & varied reactions to rapidly changing stimuli

Outcomes measured:
- Average response time
- # total responses
- # delayed responses
- # omitted responses

Stress Determination tests creates a mentally stressful situation by using computer based stimulus to discriminate, memorize and respond to different colors and acoustic signals.

High Stress Tolerance is connected to greater resilience and more strength in face of difficult situations.
Brain function (EEG) were measured pre-post Stress DT for 20 people (10 SKY and 10 control) before and after 30 days of SKY.

**Results**

- Post 30 Days of SKY
  - # of total responses
  - Average reaction time
  - # of delayed response
  - $\alpha$ power post Stress DT test

**Interpretation**

- Increased responses, less errors and reduced response time correlates to improved efficiency to handle the task (stress)
- Improved Stress tolerance and calm in SKY group
- Greater stress at baseline
- More the reduction, aka more benefit with SKY

SKY improves Stress Tolerance and enhances cognitive performance while being relaxed.