ABSTRACT

Optimal and Efficient Regulation through Yoga: A Gene Expression Study

Background:

Antarctica, has been of interest to humans to understand multiple facets of earth, evolution and changes happening in the environment. Humans travelling periodically to Antarctica undergo stress due to capsule environment and environmental conditions. Stay in Antarctica is understood to affect cognition, behavior, emotions and increase shedding of latent virus. Yoga, an ancient Indian system and way of life has been proven to alleviate stress, promote psycho-social wellbeing, regulate the autonomic nervous system, immunity, endocrine system and also improves cognitive outcomes. Despite several studies proving Yoga to be an effective intervention, the mechanism of action of Yoga practices are least understood. This gene expression study was designed with an objective to understand the role of yoga practices in facilitating human adaptation in extreme environmental conditions.

Methods:

Twenty-five Members of age 35±7.8 years, screened negative for pre-existing psychological and pathological conditions and declared clinically healthy for the 35th Indian Scientific expedition to Antarctica were recruited for the study following obtaining written informed consent. A yoga module was designed and validated for administration during sea voyage and at Antarctica. The intervention was administered for one hour daily for 87 days consisting of sea voyage and stay at Antarctica . Psychological assessments for sleep quality and perseverative cognition were performed at the start and on completion of the expedition. Blood samples were collected at four timepoints: baseline, on reaching Antarctica, while departing from Bharati and before departing

from Antarctica. Single color Gene expression studies were conducted on blood samples collected at baseline, on reaching Antarctica and before departing from Antarctica. As the baseline serum samples were not available, Biochemistry tests and chemiluminescence assays were performed on other three timepoints.

Results:

A significant improvement in daytime dysfunction [$F_{(1,16)}$ =5.214, p=0.04] and perseverative cognition [$F_{(1,16)}$ = 28.121, p≤0.001] were observed in Yoga group. Whereas, control group subjects showed a contrasting change. A pattern of constant increase in lipid profile was noted in both the groups but yoga group had associated overexpressed cardio-protective genes. Less number of genes were consistently differentially regulated in the yoga group suggesting better efficiency. A distinct pattern facilitating delaying cell cycle, promoting fatty acid biosynthesis, DNA repair, maintenance of DNA fidelity and better cellular stress response was seen in yoga group. Whereas, diverse gene expressions involving apoptosis, cell replication, promotion of oxidative stress, inflammation, and DNA repair were observed in the control group.

Conclusion:

Based on the results of this study, it appears that Yoga practices would be helpful in extreme environmental conditions and work uniquely on every individual based on their inherent nature and facilitate efficient and optimal adaptation. Based on our findings, we also propose a model of 'Intelligent Consciousness' which facilitates the congruence between the body and mind enabling the system to be optimal and efficient.