



Mind's Relaxation and Diaphragmatic Respiration on the Basis of Scientific Yoga and Its Application in Neurodegenerative Diseases

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Abstract

Neurodegenerative dysfunction is an improvement defeat of construction and utility of neurons. Parkinson, Alzheimer, central stroke, anxiety, and depression are examples of such disorders. To improve the quality of life in people with neurodegenerative diseases, Yoga therapy is operative. Yoga has valuable properties through direct influence on the sympathetic and parasympathetic activity in the autonomic nervous system. It decreases expressively neurotransmitters that are involved in these illnesses. Mind's relaxation and diaphragmatic respiration (MRDR) on basis of scientific Yoga progresses social interactions, quality of life, and helps individuals approach life with new positivity and ability. The aim of this study was to improve the significant role of NRDR techniques as complementary medicine in prevention and control of neurodegenerative disorders.

Keywords: Mind's Relaxation, Diaphragmatic Respiration, Scientific Yoga, Neurodegenerative Disease

1. Context

The science of Yoga could not be considered as unclear, dreamy or rootless. It is a practical science, a categorized assortment of rules applied to bring about a confident end. It contains the laws of psychology that could be applied to the entire awareness of humans on every plane and domain. This lucid application of the regulations of unfolding perception acts correctly on the same doctrines that the individual realizes its application every day in other departments of science (1).

About 5000 years ago, the science of Yoga emerged from the Indian subcontinent as part of the Ayurveda therapeutic discipline. "Yoga" was derived from the Sanskrit word "Yukti" meaning "Union" pointing to harmony of the sprit (consciousness) with super sprit (almighty). Ancient Yoga claims that to achieve this highest state of Yoga, a healthy body is necessary. Yoga is a spiritual exercise that uses the mind (meditation) and body (practices) to provide harmony to balance the whole system. It reconnoiters the mind's capabilities to influence the senses and the body.

The schools of Yoga could be classified as Hatha, Raja, Jnana, Karma, Bhakti, Mantra, Kundalini, Sahaja, Laya, and many more. Around 900 BC, the ancient Indian sage Patanjali evolved the eight stage of Yoga, known as Ashtanga

Yoga or integral Yoga (2). Mind's relaxation and diaphragmatic respiration (MRDR) has been developed on the basis of classical Yoga, i.e. Ashtanga Yoga (3).

Medical involvements of mind-body interventions (MBIs) are founded on the idea of the mind persuading the physical body. In September 2007 a new category was presented by the united State National Center for Complementary and Integrative Health (NICCH) (2) that incorporates primarily complementary and alternative medicine interventions, while it also contains scientifically authenticated practices, such as cognitive behavioral treatment e.g., meditation, Tai Chi, Bio feedback, and hypnosis (4-7). Nevertheless, the aim of this article was to privilege the generous role of MRDR techniques for prevention and control of neurodegenerative disorders as complementary medicine and its application in experimental medicine.

2. MRDR and Related Techniques as Physio-Psychological Functional for Stress Management

Different disciplines of Yoga, especially MRDR, which is altered from the fundamental principles of scientific Yoga and its application in mental and physical health improvement and recovery, mostly caused by stress, in-

duced changes that could be applied as preventive, adjuvant and complementary therapy (8). Synchronize and harmonize between concentration, consciousness respiration through diaphragm, and motion of the voluntary and involuntary muscles are authentic principles of MRDR techniques, found in different categories of Yoga (3).

Accurate diaphragmatic respiration along with full concentration and attention towards poses (Asanas) leads to proper metabolism at the cellular level to complete Krebs cycle to generate bioenergy i.e. adenosine three phosphates (ATP) in cell mitochondria. Followed by studies and investigations of Guz (9) in the year 1997 and Pal et al. (8) in the year 2004, respectively, it was found that respiration exercises improve parasympathetic function and on the other hand reduce sympathetic nervous activity, which may lead to improvement in the respire-rehabilitation system, cardiovascular function, reduction in the impact of distress, and help develop physical and mental wellbeing.

Inhalation is most exceptional as related to other intuitive (e.g. ingestion, cardiovascular, and hormonal system) tasks that could be synchronized voluntary. The behavioral or deliberate control of breathing is located in the cortex of the brain and expresses the aspect of inhalation with awake control, such as self-initiated change in respiration before a dynamic evacuation or struggle. Singing, talking, and playing musical instruments (e.g. flute, trumpet, etc.) are good samples of the performance of inhalation and are short-lived interferences (9).

Mindfulness respiration is regularly achieved in Yoga and meditation by practice of voluntary respiration through inhalation, retention, and exhalation. Nevertheless, Yoga breathing is considered the midstream between the mind and body (10). The breathing rate and its depth is controlled by the respiratory center, which indicates the extent (or percent) of carbon dioxide, oxygen, and acidosis in the arterial blood (11). In the arch of aorta and through the arteritis, there are receptors known as chemoreceptors that conduct signals and feedback (to the respiratory center) to increase or decrease the ventilator production reliant to the situation of these metabolic variables.

It has been shown that throughout exercise, carbon dioxide levels surge that attentive the chemoreceptors that consequently alerts the brain's respiratory center to increase the speed and depth of inhalation. This raised inhalation exonerates carbon dioxide of the body with more oxygen that is required during aerobic exercises (12).

Followed by ending of the exercise, breathing rate and depth are slowly reduced until carbon dioxide in the arterial blood proceeds to normal levels: The respiratory center will no longer be motivated, and respiration rate is re-established to a pre-exercise array. Pursued by neurotransmitter function of the respiratory center, the metabolic

control of breathing provides a feedback system, through carbon dioxide, oxygen and blood acid levels (12).

On the other hand, neurodegeneration is the progressive loss of form or function of neurons in which may lead to death of neurons. Amyotrophic lateral sclerosis, Parkinson, central stroke, Alzheimer, anxiety, and Huntington's may occur as a result of the neurodegenerative process. Currently, such diseases are incurable, may result in progressive degeneration and/or death of neuron cells. The essential pathophysiology of all neurodegenerative illnesses is the dysfunction and eventual death of neurons (13).

Neurodegenerative diseases are progressive in nature with a deterioration of clinical symptoms overtime that is a synchronous with symptoms development that may lead to cumulative loss of the neurons that produce the neurotransmitters necessary for signal propagation through assured brain circuitry associated with a given illness. Different ailment phenotypes occur with neuron loss depending on the normal population pretentious, and as a result the cell death cascade and the genetic structure of the individual. For instance, memory or coordinated movement is not the function of a single precise neuronal population or brain area yet contains several, such that the loss of one key element can disturb neurotransmitters homeostasis (excitatory versus inhibitory), hence disturbing the final integrated output of the system (14).

From the psychological point of view, stress is an aware or unaware emotional feeling or physical situation, which is due to either physical or/and mental positive or negative pressure to overcome adaptive capabilities. Stress is a psychological process initiated by proceedings that threaten, harms or challenges an organism or surpasses accessible coping recourses and it is characterized by psychological responses that are directed towards alteration.

However, physiological or biological stress is a reaction to a stressor, such as the environmental situation. Stress is the body's manner of responding to an encounter. The autonomic nervous system (ANS) and hypothalamic-pituitary-adrenal (HPA) axis are two foremost systems that respond to stress. The sympatho-adrenal medullary (SAM) axis may stimulate the fight-or-flight response through the sympathetic nervous system, that offers energy to more applicable bodily systems to acute adaption to stress, whereas parasympathetic nervous system returns the body to homeostasis (9).

The second major physiological stress pathway, the HPA axis, adjusts the release of cortisol that affects many bodily functions, such as metabolic, psychological and immunological functions. The SAM and HPA are synchronized by an extensive variation of brain regions, including the limbic system, prefrontal cortex, amygdala, hypothalamus, and stria terminalis. Through these mecha-

nisms, stress can modify memory functions, reward, immune function, metabolism, and liability to ailments (9).

Nevertheless, MBIs, like MRDR, on the basis of scientific Yoga, Tai-Chi, and meditation, are found to take charge of the process in the molecular structure and function of the body cells. Many practices and traditions, mostly in the orient, combine physical and mind control disciplines, as well as post traumatic stress disorder (PTSD). These practices are known to bring about calmness, reduce anxiety and the perception of stress, relieve depression or help people cope with chronic diseases (15-20).

The techniques of MRDR have shown significant impact on the autonomous system to control and reduce stress not only as complementary medical system yet in medicine sports e.g. to minimize the risk factor of frostbite in winter expeditions by preventing blood acidosis and stability of body temperature in subzero atmosphere (21-24).

While these methods are associated with control of hypertension, insomnia, arthritis, and many other stress-induced conditions, the mechanism by which the reported benefits arise has not been understood. Very recently, International project coordination i.e. Coventry University, (UK), Radboud University, Nijmegen, Netherland and Antwerp University, Belgium have investigated how these practices may affect the body at the cellular level. Buric et al. postulated that Mind-Body Intervention (MBI) suppresses the presence of a major factor that is known to facilitate the reaction of cells to stress, which leads to inflammation-related diseases (25).

Buric et al. considered the evidence for efficiency of MBIs in cultivating mental and physical health, nevertheless, the molecular mechanisms of these profits remain poorly understood. As a hypothesis, Buric et al. claimed that MBIs reverse expression of genes and elaborate inflammatory reactions that are reduced by stress (25).

As proteins have complex and unique shapes, or profiles, they can act as very secure 'keys' to fit specific 'key-holes' in cells, to set in motion various sequences, including the release of other proteins. When the cells create proteins, a part of the DNA, the part of that code for that protein, is copied and transferred to another part of the cell where the protein is assembled.

One group of messenger proteins, the transcription factors, specialize in setting in motion the process of copying a part of the DNA, for creation of proteins. A study of the effect of individual genes, however, is not feasible, as there are so many genes, and because genes generally work, not by themselves, but in groups. Genes are hence studied using statistical methods and computer-controlled artificial intelligence systems, to identify which ones are associated with the same pathway and related functions.

In the context of research on MBI, Buric et al. proposed

that the most studied transcription factor, or the protein that sets in motion the process of protein assembly, called nuclear factor kappa B (NF- κ B), which is found in the majority of animal cell types is involved in cellular reactions to stimuli such as stress, cytokines, free radicals, heavy metals, ultraviolet irradiation, oxidize LDL, and bacterial or viral antigens (25-28).

Regulation of the immune response to infection is due to the key role of nuclear factor kappa B (NF- κ B). Any dysfunction in the regulation NF- κ B has been shown to lead to cancer, inflammation, autoimmune diseases, infection due to viruses, and incomplete immune development. Furthermore, NF- κ B has also been found to participate in steps of synaptic plasticity and memory. This factor is released when the organism is stressed, to set in motion the 'self-defense' processes in the cell (28).

The cells then respond by releasing proteins that bring about inflammation. These proteins set in motion a 'cell survival' response or could lead to cell proliferation, to combat the threat, and to prevent run-away cell response. Furthermore, NF- κ B also sets in motion a substances that suppress the NF- κ B itself, to turn off the emergency alert (28).

3. Conclusions

In conclusion, from a clinical point of view, especially related to neurodegenerative diseases such as Multiple Sclerosis (MS) and Alzheimer, stress management through MBIs e.g., MRDR, mindfulness and physical postures of different techniques of scientific Yoga should be used for the prevention or suppression of the progressive rate of the diseases and disorders. Research on MBIs may open the door for developing and testing a multi-level theory of MBIs, which integrates the biological, psychological, and environmental levels. Effectiveness of regular MRDR techniques on stress management, which creates harmonization in MBIs intervention might be explained by neuroscience. Nevertheless, greater attention must be paid to the methodological quality of future research, as well as to progress these areas.

Footnotes

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