

Deep Breath: An Indigenous Healing for Schizophrenia

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ABSTRACT

Breath has a prime role in human mental and physical well-being. Alternating rhythms of the nasal cycle are connected to and govern the parasympathetic and sympathetic states of the autonomic nervous system (ANS). The ANS has a role in physiological, emotional, homeostatic, metabolic, and catecholamine regulation via the basic rest-activity cycle (BRAC). Hypoxia and disturbed nasal cycle lateralization may contribute to psychopathologies like schizophrenia. Deep breathing yoga exercises on a regular basis may be beneficial as a complementary therapy in restoring oxygen supply to brain neurons, correcting nasal cycle lateralization, and dealing with schizophrenia.

Keywords

Schizophrenia, Well-being, Deep-Breathing, Healing.

Introduction

Schizophrenia is a behavior disorder that underlies a variety of individual functional problems that manifest as a complete personality disorder. To cure schizophrenia, a lifelong transformation process is required, with each succeeding stage being better and more pleasant than the previous one, providing the patient with a sense of well-being day by day. It requires a strong desire to recover from schizophrenia, supported by a diligent lifestyle and continuous efforts. A full recovery may take several years, or it may be a lifelong struggle to achieve good mental health [1].

Patients often complain of a lack of general well-being during the treatment. It is possible to experience various hazardous side effects, both temporary and permanent, due to a mixture of chemicals in pharmaceutical medicines. Some of the side effects are relieved by reducing the dosage, switching to a different drug in the same class, or stopping the medication entirely. Many of those toxic side effects and symptoms persist even after reducing the pharmacological drug dosage [2].

In this novel research paper, using the introspective empiricism, a narrative review is attempted to explore the possible genesis and cause behind the psychopathology of schizophrenia by discussing

how the disturbances in various physiological systems such as the ANS, and BRAC are interconnected with the hypoxic brain neuronal cells, nasal cycle, and brain hemisphere lateralization. The following section explains how deep breathing yoga exercises can help to correct this systemic flaw. The review aims to promote early intervention and well-being while also facilitating healing from schizophrenia.

General well-being in mental health

Kasai and Fukuda recommended a value-based strategy in schizophrenia research using the “person-centered” approach and “democratizing” clinical research beyond the “evidence-based medicine” approach. Schizophrenia causes long-term impairment of the individual’s real-world functioning. Research should focus on conceptualizing scientifically towards personal recovery [3]. Subjective well-being and patients’ personal recovery should be devoted to and understood by caregivers, consumers, family members, and professionals. Personal recovery in terms of subjective well-being does not always coexist with clinical recovery. Instead, it fosters a sense of subjective well-being while also building a life that is truly enjoyable, rewarding, and fulfilling. Aside from the clinical staging modalities of schizophrenia, an early intervention strategy can be used [4].

A state of well-being is characterized by a controlled respiration and blood pressure that is maintained by a coordinated

physiological behavior [5]. With overstressed emotions, well-being is a countermeasure to the “general adaptation response” [6] or the “fight or flight response” [7,8]. Mood disorders like depression and schizophrenia are stress-related. Acute and chronic life events are usually accompanied by or triggered by prodromal phase stress [9].

To begin with, let's examine why schizophrenia occurs.

Disordered breath lateralization behind the pathogenesis' of Schizophrenia

During stress, psychophysiological systems are adversely impacted due to the heavy oxygen requirement of the brain (as compared to other body parts) [10]. It has been observed that hypoxia is associated with the development of schizophrenia [11]. An overactive left hemisphere as a result of increased stress may require a higher supply of oxygen for brain neurons. This may remain unmet due to excessive demand above the available supply, creating a condition of hypoxia in the neurons of the contralateral right brain hemisphere. When there is insufficient oxygen supply to brain neurons, forms reactive oxygen species (ROS) and reactive nitrogen species (RNS), resulting into mitochondrial dysfunction with compromised viability and defective energy metabolism. Impaired energy metabolism results in apoptotic cell death or necrosis, which in turn could further lead to neurodegeneration [12,13].

Both brain hemispheres are dysfunctional in schizophrenia because the right hemisphere is hypoactive and the left is overactive. This impairment is caused by functionally asymmetrical, lateralized body rhythms, including asymmetrically coupled CNS and ANS rhythms. Changes in nasal airflow impact left and right brain-stem oscillators, which control sympathetic tone. Peripheral autonomic nerve fibres regulate nasal airflow, dilate and constrict veins.

Deep breathing exercises can address the nasal cycle mechanism, which impacts brain function and the ANS. The ANS governs cerebral and ultradian rhythms, boosting parasympathetic activity, healing, regeneration, and immunity. Overexcessive single cerebral states can alter nasal dominance and cause brain problems.

Plasma catecholamine modulation and lateralized ultradian ANS-CNS rhythms on both sides of the body regulate the nasal cycle. Excess corticosteroids and catecholamines may disrupt adrenal hormone secretion. Schizophrenia is caused by brain neuron hypoxia, and disturbed nasal cycle patterns can affect brain lateralization, ANS, neuroendocrine secretions, BRAC, and other body systems. Regular deep breathing exercises promote brain neuron oxygenation and health.

Yoga practice and its neurophysiological principles

Decreased action of the parasympathetic nervous system (PNS) has been linked to the development of panic [14]; anxiety [15]; depression, aggression, resentment, criminal behavior, and post-traumatic stress disorder. Further, vagal afferent activity has a connection to emotional control, physiological adaptation, emotional reactivity, and empathetic response attachment [16].

Autonomic balance underlies the psychopathology of schizophrenia. The PNS activation and SNS deactivation produce stress relief to restore vagal dominance and healthy autonomic balance. The PNS and SNS operate mostly as opposing forces but can also be concurrently active in a specific area [17,18]. The PNS is inactive when the SNS is active, and *vice versa*. Hence, hyperactivity of PNS (using HRV or vagal tone as indicators) causes SNS hypoactivity in the form of vagal dominance. As such, stress is reduced by PNS respiratory stimulation during deep breathing exercises, which results in relaxation. Autonomic nervous system functioning can be influenced by manipulating various types of respiration [19]. Breathing is regulated attentively through autonomic balance changes. Respiratory vagal nerve stimulation (rVNS) is done by stimulating the vagal nerve phasically and tonically. Sudarshan Kriya Yoga and other breathing techniques have been reported to up-regulate the PNS and down-regulate the SNS and thus bring general relaxation [20]. Breathing exercise increases blood oxygenation in hypoxic individuals while also deactivating SNS activity [19]. The vagus nerve (VN) is responsible for shifting the balance from SNS to PNS [21]. Through afferent and efferent fibers, VN joins visceral organs with glands [22] forming a cranial nerve complex. It monitors the visceral homeostatic and arousal states in order that CNS brings relaxation. Respiration modulates VN activity. VN activity is facilitated by exhalation and slow respiration activity and suppressed by inhalation [23]. In this way, the beneficial effects of a deep breath on mental and physical health are achieved.

Disciplined breathing exercises have a favorable effect on the vagal afferents stimulation, which influence PNS [14] and the SNS [24]. The SNS action could be suppressed by vagal afferent stimulation via voluntary control over the ANS, which is the seat of vagal nerve regulation [24].

The vagal afferent nerve is joined to all the internal as well as external systems of the body with the help of nerves known as “Nadis” that transport electrical impulses of vital energies named “Prana”. The ANS is precisely affected by the discharge of these electrical impulses of vital energy that have their maximal action at major nerve plexuses in addition to glands named “Chakras” – the spiritual centers belonging to the body. Deep breathing influences neuroendocrine functions and lowers cortisol – the stress hormone [25]; levels of anti-stress and social bonding hormone prolactin are increased. Breathing exercise also promotes the production of oxytocin and vasopressin [26]. Regular heart rate and cardiac vagal tone is enhanced.

How deep breathing works

The vagus nerve, which originates in the brain stem, is also impacted by the psychopathology of schizophrenia. There are many possible physiological mechanisms to stimulate the vagus nerve (VN) (as biofeedback) through certain respiratory patterns. The first is indirect through baroreceptor reflex activity [27,28]. Mechanoreceptor (baroreceptors), when stretch-activated in blood vessels, the heart node vagal branch regulates blood pressure by reducing the heart rate. The cardiovagal baroreflex index can be

reduced through a respiration rate of approximately 6 breaths per minute. Increased vagal tone lowers the heart rate, and more frequent reflexes are the result of decreased sensitivity [29,30].

The second is direct, via the feedback mechanism of the pulmonary mechanoreceptors in the lungs. Slow respiration and extended exhalation result in the inhibition of central drive and a significant lung volume increase (during inhalation), which further trigger the Hering-Breuer reflex. The physiological response is initiated due to the tidal volume and upstream relay of VN afferents [31,32]. With each deep breath, the practitioner initiates a breathing style that relays relaxation and activates VN through the immediate stimulation of the reflex.

James-Lane's physiological feedback hypothesis explains yet another indirect and much slower route [33,34]. Emotional arousal or relaxation grows from peripheral physiological responses. A physiological state change in the body can contribute to the bottom-up transformation of dysfunctional emotions. Mind relaxation can, however, relax the body also. In summary, we can say that consistent physiological relaxation produces vagal dominance and therefore releases chronic stress. In this way, VN stimulation can ameliorate and prevent stress-related disorders from occurring.

Pranayama – Deep Breathing Exercises

Setting – The following described asanas can be performed routinely twice (morning-evening), in a natural, fresh, and oxygen-rich atmosphere. One must have an empty stomach for at least five hours without food. Relax on an even carpet surface in a calm, elegant, and tidy environment. Take a comfortable position, such as padmasana, sukhasana, or vajrasana. The spine should be erect, legs overlapped, and eyes closed. Practicing these asanas requires the left palm to be placed over the left knee, and the right palm to be placed over the right knee. Beginners should at least devote three to five minutes a day to this exercise. For optimal results, the practice time can be gradually increased to a half hour after a few weeks of consistent practice. It is imperative not to overwork the body during the exercise and to practice in an easy and natural manner. It is advised to take a half-hour break before bathing or eating. It is important to perform these asanas correctly in order to avoid any negative effects on one's health. Prior to beginning such practices, one should seek the guidance of a yoga instructor.

Mool-Bandh – To increase the benefits manifold, Mool-Bandh could be performed concurrently with these asanas, by contracting the rectum with the help of the hip muscles. Mool-Bandh may help in increasing the benefits by enhancing the power and vitality of the body by trapping the energy in the body [35].

Anulom-Vilom or NadiShodhan Pranayama (Alternate Nostril Breathing)

Anulom-Vilom pranayama the best pranayama, or deep breathing exercises, for schizophrenia, depression, anxiety, and stress. Continuous, dedicated practice of this asana (exercise) over a long time helps to gradually restore oxygen supply to the brain neurocells, which had died earlier due to anoxia. The meaning of

Anulom-Vilom, a Hindi word, is “alternate nostril breathing.” It is also named NadiShodhan Pranayama because it cleans (shodhan) the veins (nadis) of the body by eliminating impediments and toxins from the blood.

In addition to rejuvenating dead neurons, this asana would also benefit the brain and body when practiced for a long period of time.

Technique: Close and open the nostrils with the right hand's thumb, ring, and little fingers while doing alternate nostril breathing. Hold up your right arm and close the right nostril with your thumb, then take a deep breath of fresh air into the left nostril for four counts and complete the full lung breath. Retain the breath for a total of sixteen seconds or less by keeping the pair of nostrils closed. Calmly exhale through the left nostril to the count of eight. Then, using the ring and little finger, close the left nostril and take four full, deep breaths through the right nostril. Close both nostrils and hold your breath for the count of sixteen. Calmly exhale through the left nostril to the count of eight. Repeat these above steps [36].

Benefits: It helps balance chemical and hormonal deficiencies in the body and renders absolute mental, emotional, and physiological harmony, union, and calmness to the mind. The symptoms of anxiety, stress, and depression gradually diminish as consciousness progresses to advanced levels, releasing all mental, emotional, and physical deficiencies. In addition to the cleansing of the body's nerves and veins, the aura is also enhanced. This asana is most useful for those who quickly get angry over pretty minor incidents. It is helpful in battling auto-immune diseases, low and high blood pressure, and clearing blockages in the heart. Additionally, it heals migraine pain, paralysis, epilepsy, and eye problems. It also gives a depressed person a bright facial glow.

Kapalbhati Pranayama (Skull Shining Breathing)

Technique: Take a deep breath and exhale energetically, producing hissing vociferation, so that your belly goes deep inward. While exhaling, visualize all the blockages in the body being cleared and all the illnesses being expelled through the breath. Following exhalation, inhalation should be automated and stress-free. The diaphragm contracts during inhalation, causing the abdomen to move outward and downward, and it expands during exhalation, causing the abdomen to move inward and upward. Beginners should practice the above exercise by repeating the energetic exhaling action for at least three minutes and then resting. Inhalation shall be passive, deep, and almost nonexistent, while exhalation should be active as well as forceful. Subsequently, a few months down the line, the duration of this exercise may be increased progressively up to twenty to twenty-five minutes for an optimal convention. This exercise should be carried out at a gentle pace. Practicing Mool-Bandh along with this exercise, enhances the benefits manifold. This exercise is not recommended for women who are pregnant or menstruating [37].

Benefits: This exercise brings positivity to thoughts while also providing emotional and mental stability by calming the mind. It

relieves hypertension, depression, stress, and anxiety. Additionally, it also heals neurological disorders, migraine, gastric diseases, asthma, allergies, sinuses, hair fall, erectile impairment, and all reproductive problems. Insulin production and pancreatic activity are healed [38]. In addition to removing harmful body toxins, this exercise helps reduce excessive fat, reduce body weight, energize the body, and vanquish negative emotions.

Bhramari Pranayama (Humming Bee Breathing)

Bhramri pranayam is so named because it relates to the humming bee (Bhramar) and results in a humming sound while exhaling the breath. Anger, agitation, frustration, and other negative emotions are impeccably liberated by exercising this asana for a long time.

Technique: Place your thumbs on the tragus gently; with your fingers on your forehead, keep your eyes closed with your spare three fingers. Inhale a deep breath, gradually and tenderly, through both nostrils. Vocalize “Aum” or “Om” whilst exhaling and creating a “hmm...” Bee-like humming sound. Visualize disorders being expelled from the body and try to feel happy. It can be performed for five minutes a day in the beginning.

Benefits: The mind becomes steady and focused. Blockages in the auric energy are opened, and the brain is filled with a feeling of happiness. It reduces stress by relaxing the mind and controlling hypertension. It reduces mental agitation and tension. Additionally, it helps in battling Alzheimer’s disease, and headaches and paralysis-like diseases are healed [39].

Sheetali Pranayama (the Cooling Breath)

Technique: Twirl the tongue into a semi-tubular shape, and then inhale a deep breath through the mouth and throat to deliver it to the lungs so that they are fully filled with fresh and cool oxygen. Now shut your lips. Retain the breath for as long as conveniently possible. Finally, exhale through the left nostril while blocking the right nostril with the thumb of the right arm. Initially, practice for 3-5 minutes and increase the duration weekly through training [40].

Benefits: It cools down the brain as well as the body [37].

Sheetkari Pranayama

Technique: Twirl your tongue back and lightly clench your upper and lower teeth, keeping your lip pairs apart. Take a deep breath by way of the mouth and throat to deliver it to the lungs so that they are fully filled with fresh and cool oxygen. Now close your lips. Maintain your breath as much as possible. Ultimately, exhale through the left nasal path, blocking the right nasal path with the help of the right arm’s thumb. Repeat the procedure for at least 3-5 minutes [40].

Benefits: It has been observed that Sheetali and Sheetakari pranayamas are very helpful in battling mental illnesses. Sheetkari pranayama has a cooling effect on the brain and the body. It regulates body temperature and is thus useful in fever. Restlessness and anger are completely healed by this pranayama [41].

Other Pranayama Exercises

HathaYog, Sudarshan Kriya Yog, AyangarYog, Tribandha Pranayama, Bhastrika Pranayama, Ujjayi Pranayama, and Kundalini Yog are some other pranayamas that have been found to be very beneficial in battling mental illnesses and should be learned and practiced without fail to achieve good mental health.

Yoga is a golden age psycho-philosophical practice that imparts electro-positive reformation in physical and mental health. The essence of yoga in the Sanskrit language is “to unite.” Yoga philosophy holds that the practitioner yogi can unite universal cosmic energy with his own personal life energy. Yoga exercise training is an ancient science dating back to 5000 BCE. Patanjali defined the eight limbs of yoga as follows: ethical and moral values, self-learning of ancient wisdom, meditation combined with physical poses, deep breathing exercises, exercising control and prohibiting physiological sensual pleasures, learning to follow the appropriate belief, mindfulness meditation, and ultimately attaining union with universal divine power.

Deep breathing exercises have no negative side effects when performed correctly. However, when performing deep breathing exercises, a practitioner should keep in mind that this is not a medical treatment for mental illnesses. Most people may not have any immediate recovery; hence, the prescribed medication (if any) should not be discontinued altogether. The benefits of deep breathing therapy develop over time, and the patient should keep visiting the consulting doctor throughout the period spent practicing deep breathing. Also, the effectiveness of complementary practices such as deep breathing is not the same for everyone, and pharmacological therapies should not be completely stopped abruptly [41]. As a result of breathing exercises, patients' behavior, mood, and quality of life are reported to have improved. The patient's relapse risk and illness severity are significantly reduced with the acquisition of general well-being feelings over many months of consistent pranayama practice. Recovery time is shortened even after a relapse. However, there may be a long wait before any significant recovery is felt after continuously and devotedly practicing deep breathing exercises for several months or years. The research literature is full of experiments conducted on the beneficial role of deep breathing in schizophrenia [42-46]. Unfortunately, our scientific understanding of the neural mechanisms responsible for the development of schizophrenia psychopathology is yet undeveloped fully. This has hampered progress in the invention and development of superior new therapeutic interventions such as pranayama. There is an urgent need for more exploration of complementary and alternative medicine.

Conclusion

Deep breathing as a complementary therapy for psychopathology is a more effective way of reducing pharmacological drug dosage and improving overall well-being. Deep breathing exercises can oxygenate the degenerated neural cells, allowing them to slowly regenerate over time and restore the disturbed nasal cycle in schizophrenia. This would aid in the restoration of the ANS's

sympathetic and parasympathetic states, as well as vagal toning, and lead to improved mental health.

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