"Investigating the Brain Activity Correlates of Humming Bee Sound during Bhramari Pranayama"

Yoga is an ancient practice of right living. Lately, interest in yogic practices has increased among people. Yoga techniques are primarily divided into different postures (*asana*), breathing techniques (*Pranayama*), and meditation (*Dhyana*). Pranayama is explained as *prana* (=) life and *ayam* (=control), which is an interface with our autonomic nervous system.[1,2] With the growing interest in the different ancient practices, namely, yoga, Taichi, qigong, etc., more insight is achieved regarding the different physiological effects of them. Modern research in the biology of these practices unfolds the effects on different systems of our body including the nervous systems. The present study published in this issue "Investigating the brain activity correlates of humming bee sound during Bhramari Pranayama" highlights the effect of one of the Pranayama techniques called *Bhramari* on brain electrical activity.[3] The authors have investigated the humming bee sound (short and long duration) of the Bhramari Pranayama and the cortical correlates on the brain through EEG recording. They measured the power spectral Doppler (PSD) of different of EEG bands and their persistence during and after the humming sounds. They used a novel wearable nasal device with a sound sensor at a sampling rate of 13 Hz with EEG synchronization. The idea was to see how the humming sound could influence the EEG correlate. The short humming sounds are associated with the frontal lobe and long sounds with occipital lobe activities of theta waves, which are important in processing memories. The authors concluded that a wearable sound sensing device may be used to create a real-time biofeedback system. Thus, a desirable electrical change in the brain may be achieved through a sound modulated feedback system. A proper pranayama technique is paramount to create the desired sound frequency and maintaining it for a desirable duration. Real-time biofeedback is a novel idea to fine-tune the appropriate yoga techniques. Similar systems may be developed to achieve various other physiological goals of yoga and that paves the way for future research in understanding the biology of yoga or similar ancient practice.

We already have some evidence about the multi-system beneficial effects of yoga. A systematic review on the physiological effects of Bhramari Pranayama also highlighted the abundance of gamma activity in EEG during or even after the practice session in addition to the lowering of BP and pulse rate and cognitive improvement.[4] Parasympathetic override may explain the cardiovascular effect of Bhramari Pranayama.[5] Kundalini yoga is found to have an immediate effect on salivary level of cortisol and perceived stress level.[6] Vipassana meditation is also found to have increased occipital gamma activation, which in turn has control over attentional engagement and the autonomic system.[7,8] A direct application of different yogic techniques in daily exercise schedules (like Hathayoga[9]) or in some disease conditions like diabetes mellitus and obesity are also well documented.[10,11]

Though our understanding of the different physiological effects of yoga has improved, it is still not well understood how they impart their effects at a cellular or molecular level. The concept of epigenetic changes following mindful practices has long been suggested to bring changes through genetic expressions without any change in DNA sequences. An altered profile of whole genome methylation has been observed in different disease conditions including post-traumatic stress disorder and depression.[12] More research into the molecular and cellular basis of yoga will help understand the usefulness of those ancient practices along with their application in life. The current paper in discussion generates useful research questions and more studies are needed in this field.

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