

Scientific Yoga Research in India

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Abstract: *Yoga research in India began thousands of years ago, with the experiences of the great sages. Actual studies in the laboratory began in the 1920s by a sage, Swamy Kuvalayanada who had an ideal blend of medical and spiritual knowledge. He founded a yoga center called Kaivalyadhama (in west India). Through the 1920s until the 1960s the world over people wanted to study extraordinary powers of exceptional yogis. Exciting experiments were conducted at the All India Institute of Medical Sciences, New Delhi and on the late Swami Rama (from Rishikesh) at the Menninger Foundation (in the U.S.). However these experiments seemed to suggest that yoga had little to do with the common man and the effects required years of practice with extreme sacrifice. This changed when in the late 1960s Maharishi Mahesh Yogi introduced transcendental meditation to the world. For the first time changes were seen in University students after a short duration of practice. This led to research at Swami Vivekananda Yoga Research Foundation (south India) which published and is publishing some of the most rigorously controlled trials on the therapeutic effects of yoga, the National Institute of Mental Health and Neurosciences (south India) and the Defense Institute of Physiology and Allied Sciences, which took yoga to the Indian army. At this stage most of the research and interest in yoga was in India, the place of its' origin. However the majority of Indians located in villages knew little about yoga, assuming the practice was for the educated, urbanized Indian. This changed with the mass movement of Patanjali Yogpeeth, which has taken yoga and ayurveda to Indians in remote villages. The institution is actively engaged in research and the results will be presented.*

Key words: *yoga, scientific research, India*

Introduction

The earliest research in yoga began in the 1920s in Kaivalyadhama, Lonavla, Maharashtra, which remains an active yoga education and research institution even today. Experiments were conducted by Swami Kuvalayananda and the observations were meticulously noted in a journal (*Yoga Mimamsa*) (Kuvalayananda, 1925). What was particularly interesting was that these studies examined fairly complex yoga techniques (e.g., *navli* and *agnisara*), and used assessment techniques which were relatively novel at the time, such as X-rays and measurements of the barometric pressure within the viscera. This period of meticulous research was followed by research on the special powers which yogis attain after dedicated and committed practice, which are called *siddhis*.

Yoga researches overview

At the All India Institute of Medical Sciences (A.I.I.M.S.), New Delhi, Anand, Chhina and Singh (1961) recorded the changes when a yogi (*Ramananda Yogi* from Hyderabad) was confined in an

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airtight box. Recordings were made twice. First, a burning candle was placed inside the box and the yogi remained in the box for eight hours. Second, the yogi remained in the box for ten hours without the burning candle. On both occasions he did not develop tachycardia or hyperpnea. In the same year, a study was conducted to compare the ability to voluntarily control the heart through yoga, with control using the Valsalva maneuver (*Wenger, Bagchi, Anand, 1961*). In one out of four yogis the heart rate slowed down. Based on this the authors assumed that as a result of some voluntary muscular mechanism vagal input to the sino-atrial node had interrupted the regular cardiac cycles.

The idea of confining yoga research to experienced yogis with special attainments was radically altered when *Maharishi Mahesh Yogi* introduced Transcendental Meditation (TM) to the world (*Maharishi Mahesh Yogi, 1966*). The effects of practicing this relatively simple technique in people who had no previous experience of meditation led to a shift in the focus of yoga research (*Wallace, 1970*). Following these studies a series of rigorous, randomized controlled trials were conducted by *Chandra Patel* a London cardiologist, which showed the usefulness of yoga as an add-on treatment in the management of hypertension, when compared to conventional treatment and to biofeedback (*Patel, 1975; Patel, North, 1975*). This led to an interest in the use of yoga in the management of other conditions considered psychosomatic in origin. At the Swami Vivekananda Yoga Research Foundation (SVYASA) in Bangalore, a randomized controlled trial showed that a combination of yoga practices reduced symptoms and the need for medication in persons with bronchial asthma (*Nagarathna, Nagendra, 1985*). This was followed by a series of studies which examined the effectiveness of particular yoga techniques for specific diseases. *Virendra Singh* (currently a professor of pulmonary medicine at Jaipur, and who had conducted a number of trials while in the U.K.) examined the use of a cleansing technique called *kunjla* (*Singh, 1987*) and of voluntary regulated breathing, or *pranayama* (*Singh, Wisniewski, Britton, Tattersfeld, 1990*), for bronchial asthma. The latter study was the first (and remains the only) placebo-controlled study in yoga research, as a 'placebo' for yoga practice is difficult to devise. Here Singh and his colleagues randomized bronchial asthmatics to two groups. One group were asked to breathe through an active device (which made the breathing resemble *pranayama*), while the other group breathed through a 'passive' device, which had no effect on breathing. *Datey, Deshmukh* and their colleagues (1969) from Bombay (Mumbai) showed that *shavasana* was effective in the management of hypertension (*Datey, Deshmukh, Dalvi, Vinekar, 1969*). However, a further change came in the thrust of yoga research with the epoch-making study conducted by *Dean Ornish* (*Ornish, 2002*) the University of California, San Francisco, which showed that a lifestyle change can effectively reverse coronary heart disease (*Ornish, 2002*). Subsequently and more recently, research at A.I.I.M.S., New Delhi showed the effectiveness of a ten-day lifestyle change for various psychosomatic ailments (*Bijlani, Vempati, Yadav, Ray, Gupta, Sharma, Mehta, Mahapatra, 2005*).

Reverting to the early 1980s another important step in yoga research was taken by the Indian Council of Medical Research which funded a multi-faceted project to understand the neurophysiological changes in *pranayamas* and meditations under *Desiraju* at the National Institute of Mental Health and Neurosciences (NIMHANS, Bangalore) (*Desiraju, 1983*). The project used what were, at the time, state-of-the-art assessment techniques including different modalities of evoked potentials, fast-Fourier transform analysis of the electroencephalogram, polysomnography, and various methods to assess neurotransmitter levels and their metabolites. The main research methodology innovation was that subjects were studied in repeat sessions to assess intra-individual variability and each subject was assessed in 'experimental' and 'control' sessions (i.e., a self-as-control design, rather than a matched groups design, which was used in most studies before this (*Telles, Desiraju, 1993; Telles, Joseph, Venkatesh, Desiraju, 1993*)).

It was also considered interesting to understand whether yoga would be of use in other applications, such as stress management, or in maintaining homeostatic functioning under adverse environmental conditions. Research at the Defense Institute of Physiology and Allied Sciences (D.I.P.A.S., Delhi) showed that yoga practice helps soldiers adapt to extremely difficult and demanding environmental conditions (*Rawal, Singh, Tyagi, Selvamurthy, Chaudhuri, 1994; Selvamurthy, Ray, Hegde, Sharma, 1988*). Very recently, a study by SVYASA, Bangalore demonstrated that yoga can even help in extreme environmental calamities, based on a post-tsunami study conducted in the Andaman Islands (*Telles, Naveen, Dash, 2007*). Other useful and interesting applications of yoga have been evaluated. A study in a medical college in Mumbai showed that yoga reduces examination stress in medical students (*Malathi, Damodaran, 1999*). Another study also from Maharashtra (i.e., *Ghantali Mitra Mandal*) demonstrated that yoga reduces stress in jail inmates (*Vyavahare, 1994*).

While various centers across the country are continuing to study therapeutic and other applications of yoga, most researchers have more recently attempted to understand how the benefits are obtained. Most relevant perhaps are studies on depression (*Janakiramaiah, Gangadhar, NagaVenkatesha Murthy, Harish, Subbakrishna, Vedamurthachar, 2000*), schizophrenia (*Duraiswamy, Thirthalli, Nagendra, Gangadhar, 2007*) and on epilepsy (*Sathyaprabha, Satishchandra, Pradhan, Sinha, Kaveri, Thennarasu, Murthy, Raju, 2008*) by different groups at the N.I.M.H.A.N.S., Bangalore, studies on yoga for irritable bowel syndrome by *K.K. Deepak* at A.I.I.M.S., New Delhi (*Taneja, Deepak, Poojary, Acharya, Pandey, Sharma, 2004*), and studies on yoga for complicated pregnancies (*Naendran, Nagarathna, Narendran, Gunasheela, Nagendra, 2005*) and on discomfort related to perimenopause, respectively, at SVYASA, Bangalore (*Chattha, Nagarathna, Padmalatha, Nagendra, 2008*). There is also an interest in use of yoga in specific professions, as for professional computer users (*Telles, Dash, Naveen, 2008; Telles, Naveen, Dash, Deginal, Manjunath, 2006*) and personnel in the army (*Telles, Bhardwaj, Kumar, Kumar, Balkrishna, 2012*).

There have also been attempts to specifically understand changes in the nervous system related to yoga practice, using evoked potentials (*Panjwani, Selvamurthy, Singh, Gupta, Mukhopadhyay, Thakur, 2000; Raghuraj, Telles, 2004; Telles, Raghavendra, Naveen, Manjunath, Subramanya, 2012*), transcranial Doppler (*Naveen, Nagendra, Telles, Garner, 1999*), functional magnetic resonance imaging in a preliminary study (*Naveen, Telles, 2003*), and polysomnography (*Sulekha, Thennarasu, Vedamurthachar, Raju, Kutty, 2006*).

In the last five years public awareness about yoga has increased multifold through the teachings of *Swami Ramdev* (*Anand, 2007*), who has disseminated yoga practice in camps conducted all over the country, which are also telecast to a wide audience of yoga enthusiasts. This has at last made yoga accessible to people all over the country, irrespective of their age, educational status, level of physical activity (or inactivity), and health. These techniques were shown useful in the management of hypertension, type 2 diabetes, and obesity in a pilot study (*Gokal, Shillito, Maharaj, 2007; Telles, Yadav, Kumar, Sharma, Visweswaraiyah, Balkrishna 2012*). Detailed investigations of the physiological effects of these practices have been and are being conducted at the institution, Patanjali Yogpeeth in Haridwar, north India (*Telles, Naveen, 2008*). More recent studies at Patanjali Yogpeeth have demonstrated the usefulness of the yoga taught (called Patanjali yoga), while examining the underlying mechanisms, for obesity and metabolic syndrome (*Telles, Naveen, Balkrishna, Kumar, 2009*), type 2 diabetes mellitus (*Telles, Naveen, Balkrishna, 2010*), rheumatoid arthritis (*Telles, Naveen, Gaur, Balkrishna, 2011; Telles, Singh, Balkrishna, 2012*) more common conditions such as neuroticism (*Telles, Naveen, Kumar, Balkrishna, 2012*), and even for post-traumatic stress disorder in flood survivors (*Telles, Singh, Joshi, Balkrishna, 2010*).

Conclusion

It is encouraging to note that research on yoga which began almost a century ago in India, continues to be of great interest in yoga institutions as well as in medical institutions of national importance. Equally encouraging is the fact that research in this area is being actively funded by the Government of India. It is important and fitting that research on the effects and applications of yoga is carried out with a maximum blend of knowledge of the traditional texts along with present-day scientific method.

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