

## Chapter 2

# The Psychophysiology of Yoga Regulated Breathing (*Pranayamas*)

**Shirley Telles**

*Patanjali Research Foundation, India*

**Nilkamal Singh**

*Patanjali Research Foundation, India*

### ABSTRACT

*The aim of yoga is to attain a mental state free from disturbance. Various yoga techniques have been prescribed for this in traditional yoga texts. The ancient yoga masters realized there was a close association between the functioning of the breath and the mind. Voluntarily regulated yoga breathing (pranayama) involves regulating various aspects of breathing of breathing: (i) breathing through one or both nostrils (ii) increasing the depth of breathing (iii) breathing with a period of breath holding (iv) exhaling with the production of a sound (v) breathing through the mouth and (vi) increasing the rate of breathing. The present chapter discusses these yoga breathing techniques. This chapter also discusses the psychophysiological effects of yoga regulated breathing based on the findings of scientific studies on the psychophysiology of yoga regulated breathing.*

### INTRODUCTION

Yoga is an ancient Indian science intended to help an individual to advance spiritually (Taimini, 1961). According to the eight limbs of yoga (*astanga yoga*) of the sage Patanjali (Circa 900 B.C.) the techniques prescribed begin with following certain ethical principles (i) *yamas* and (ii) *niyama*. After this a practitioner performs specific physical postures (iii) *asanas* which allow the practitioner to remain in the same posture without moving which is considered necessary prior to meditation, practices voluntarily regulated yoga breathing practices (iv) *pranayamas*, withdraws the mind from sense objects (v) *pratyahara*, practices concentration (vi) *dharana* and meditation (vii) *dhyana*. At this stage practitioner is suppose to attain a state of self-realization (viii) *Samadhi* or *Nirvana* in Buddhist philosophy.

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The word, *pranayama* is derived from two Sanskrit words, namely, *prana*, which means “vital force” or “life energy” but can also be used to convey “breath”, and *yama*, which means “to prolong”. Hence, *pranayama* techniques involve voluntarily slowing down and prolonging breathing. The correct way of breathing according to yoga is recognized to be slow, deep, diaphragmatic and with inhalation and exhalation in a ratio of 1:2 (Singh, Wisniewski, Britton, & Tattersfied, 1990). Voluntarily regulated yoga breathing techniques or *pranayamas* are given special emphasis as ancient yoga masters realized the close association between the breath and the mind. This has been described in *Hatha Yoga Pradipika* (Circa 1500 B.C.) in this verse “When the *prana* (used synonymously with the breath) moves, *citta* (the mental force) moves. When *prana* is without movement, *chitta* is without movement. By this (steadiness of *prana*) the yogi attains mental steadiness and should thus restrain the *vayu* or airflow” (*Hatha Yoga Pradipika*, Chapter II, Verse 2).

Breathing is an important physiological process for survival as it is the only means to supply oxygen to the cells so that they can produce energy. It is also one of the important pathways to eliminate waste products from the body. The relationship between the breath pattern and health is well established (Lieber, & Mohsenin, 1992). Apart from this, breathing has been associated with higher brain functions. A recent study reported that the rhythm of breathing can enhance emotional judgments and memory recall (Zelano et al., 2016). The participants in this study were able to recognize a fear-inducing face more quickly and their ability to remember objects increased during inhalation compared to exhalation. These effects of breathing disappeared when subjects breathed through the mouth. From the findings of this study it appears that the influence of breathing on the brain depends on whether you are inhaling or exhaling and whether you breathe through your nose or mouth. This has been reported elsewhere as well (Shannahoff-Khalsa, Boyle, & Buebel, 1991).

In yoga, there are several techniques to consciously regulate various aspects of breathing, such as the rate and depth of breathing, the nostril breathed through, including a period of breath-holding, as well as other factors (Ramdev, 2005). Yoga techniques may include a period of breath holding following either inspiration or expiration. Still other methods include breathing through the mouth, which is not usually recommended.

## **YOGA BREATHING TECHNIQUES THAT INVOLVE BREATHING THROUGH ONE OR BOTH NOSTRILS**

One of the ancient yoga texts is called the *Swara* yoga texts, so ancient that the origin is difficult to trace. Here *swara* approximates the flow of air through the nostrils in the form of energy. The text describes different and distinct effects of breathing through a specific nostril. The effects of breathing through the right nostril, the left nostril, or through both nostrils alternately have been described separately (Muktibodhananda, 1999). This text mentions that breathing through the right nostril is believed to be heat generating and that a person should carry out activities requiring energy while the right nostril is patent. These activities include studying the scriptures, hunting, scaling a fort or mountain, controlling an elephant, horse, or chariot (*Shiva Swarodaya*, Chapter V, Verses 114-123). In contrast, breathing through the left nostril is considered to be heat dissipating. The *Swara* Yoga text mentions that while breathing through the left nostril, one should carry out activities which are not especially vigorous but which are spiritually inclined such as building a temple, performing acts of service, cultivating the land, and carrying out religious rites (*Shiva Swarodaya*, Chapter V, Verses 102-113). It was also mentioned

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