

# Evaluation of the Quality of Sleep in Healthy Individuals Based on Practice of Common Yoga Protocol—A Pilot Study

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## Abstract

*Sleep is a basic requirement of all living beings. Specially, in human beings it is considered as one of the supportive factor of existence. Ahara (food), Nidra (sleep) and Bramhacharya (righteous conduct/celebacy) are the three factors explained in classical texts as Traya Upastambha (Tripods). Not only Ayurveda literatures, its description and importance is available in Upanishads too. Mandukya Upanishad has allotted a full chapter on sleep and consciousness. But, as the era has entered into competitiveness, jealousy, ego, etc., people are lacking in quality sleep owing to various stressors, inviting different ailments of psycho-physiological origin. Problems regarding sleep can arise in the form of symptom and also as a disease itself. According to Philips Global Sleep Survey, in Indian population, 83.4% had some type of sleep disorder. Symptoms of insomnia were reported by 78.2% of the population and 29.2% had moderate-to-severe insomnia. Worldwide, 78.4% of the population have poor sleep quality. Almost 67% of adults report sleep disturbances at least once every night and approximately 62% of adults around the world report improper sleep. A pilot study was conducted on 11 healthy individuals. They were selected on the basis of Pittsburgh Sleep Quality Index and subjected to practice of common Yoga protocol every day for 45 min for a period of 45 days. The mean difference of the group before and after the procedure was 4.00 at 95% confidence interval (df = 10; paired t test= 5.5086; standard error of difference = 0.726; P-value<0.001). By conventional criteria, this difference is considered to be highly significant statistically. Therefore, it can be concluded that common Yoga protocol is effective in improving the sleep quality in healthy individuals statistically. Better results can be achieved clinically in sleep deprivation and thus decrease wide variety of diseases.*

**Keywords:** Common Yoga practice (CYP), Pittsburgh sleep quality index (PQSI) scale, sleep, sleep disorders, quality sleep

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## INTRODUCTION

Sleep is the natural state of the body which seizes the consciousness of a person [1]. Acharya Charaka stated that when mind as well as body gets tired, they become inactive and deprive their sensory and motor functions, senses become inactive and then the person falls sleep [2]. Acharya Sushruta opines that sleep occurs when *Hridaya* (heart region) which is a place of *Chetana* (consciousness), gets wrapped up by *Tamas* [3]. The commentator of *Astanga Sangraha* explained that when *Shleshma* overlaps *Manovaha Srotas* (subtle channel of mind) and mind is devoid of sense organs due to fatigue, then the person falls asleep [4]. *Madukyopanishad* stated that when the function of mind is completely ceased due to exhaustion, then sleep occurs which is called as *Shusupti* (condition of sleep) [5].

### Importance of Sleep

Three supporting pillars of life have been explained in *Ayurvedic* literatures which plays a vital role in maintaining human health. *Ahara* (food), *Nidra* (sleep) and *Bramhacharya* (righteousness/celibacy) are collectively known as *Traya Upastambha* (tripods). The value of sleep is established by its inclusion in the three *Upastambha* (supporting pillars). Acharyas stated that, happy and sorrow, growth and wasting, strength and weakness, virility and impotence, the knowledge and ignorance as well as the survival of life and its termination depend on the sleep, while explaining about *Nidra* (sleep) [6].

Night time sleep is always beneficial to health as it helps to attain *Dhatu Samyata* (balancing body constituents), improves vision, complexion, and digestion [7]. According to Acharya Sushruta, one who sleeps in proper place and time is always devoid of disease, mind is always calm and cool, have improved features, virility and live long and healthy life [8].

Apart from all the afore explained beneficial impacts on quality sleep in the body, due to the different stress factors of present time, many people lack proper sleep and end up in suffering with different physical and psychological ailments. Most commonly known sleep problems are insomnia, obstructive sleep apnea, narcolepsy, and shift work disorder. It is estimated that 25–30% of adults suffer with at least one of the sleep disorders globally [9]. According to a study conducted in Indian population by a consumer products giant, nearly 93% are sleep-deprived [10]. Improper sleep pattern gives rise to different kinds of cardiovascular problems, diabetes, hypertension, obesity, neurocognitive dysfunction, psychiatric problems, etc. [11]. The present study has aimed to evaluate the quality of sleep in healthy individuals based on the practice of common yoga protocol (CYP).

One of the randomized trial by Manjunath and Telles reported that six months of regular Yoga practice in geriatric sample has reduced many problems related to sleep when compared to control group [12].

Yoga includes all varieties to keep the body in balance. It includes breathing practices to balance biofuel, physical practice to balance and stretch the body along with psychophysical ease and meditation [13]. Yoga is not only related to *Asana* (different body postures) but also breathing, concentration, *Mudras* (different gestures), and *Bandha* (lock). Yoga has been adopted in various ways around the world and has several positive effect in many disorders depending upon the different possible mechanisms. The exercise component of practice of *Asanas* has been shown to improve the thalamic GABA to modulate serotonergic and noradrenergic systems and to release opioid. The *Pranayama* component influences the hypothalamic- pituitary-adrenal system and decreases cortisol levels. Further breathing control can lead to recalibration of sympathetic nervous system via vagal stimulation. Daily practice of Yoga has also been shown to increase melatonin levels and improve immune response. Hence, the studies regarding Yoga and sleep disorders confirm that Yoga has effective action on stress reduction with a potential direct impact on insomnia by increasing the levels of melatonin [14].

Therefore, a pilot study was conducted to observe the effect of CYP on sleep quality. It also provides information to researcher for the main study and similar other studies [12].

### MATERIALS AND METHOD

Healthy volunteers were enrolled on the basis of Pittsburgh Sleep Quality Index (PSQI). The optimal sample size obtained was 12. All the 12 participants were enrolled in the study after getting consent from them. Out of 12 participants, one participant dropped out due to some health conditions.

#### Selection Criteria

For this pilot study, volunteers were screened from the outpatient department (OPD) of Swasthavritta, ITRA, Jamnagar, Gujarat, India. The participants were enrolled based on inclusion and exclusion criteria.

### **Inclusion Criteria**

Participants in the age range of 20–30 years, willing to participate and with no chronic clinical conditions were included in the study.

### **Exclusion Criteria**

Participants below 20 and above 30 years of age, with chronic illness, already practicing Yoga were excluded. They were free to withdraw at any time, if wanted to discontinue due to any reasons.

### **Questionnaire**

#### **Pittsburgh Sleep Quality Index questionnaire (PSQI) [15]**

Sleep quality and quantity were assessed subjectively using the PSQI. The PSQI includes seven components of subjective sleep—sleep quality, sleep onset latency (SOL), sleep duration, sleep episode (SE), sleep disturbance, the use of sleep medications, and daytime dysfunction. The overall score ranges from 0 to 21, with higher scores indicating poor quality sleep and scores below 5 considered to be high-quality sleep.

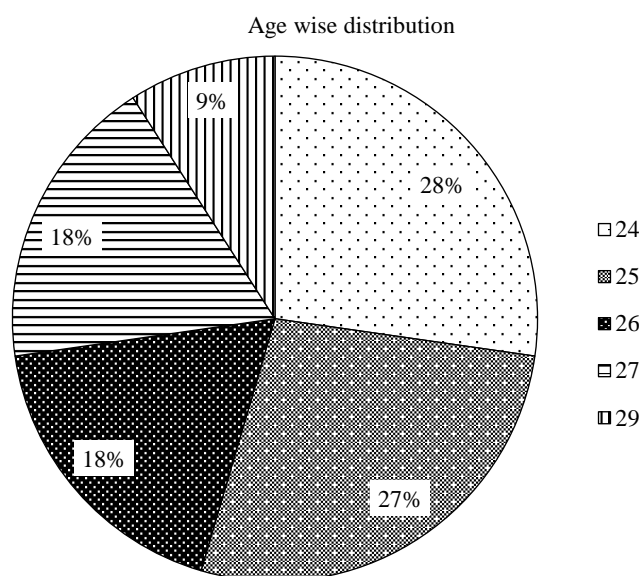
### **Yoga Session Details**

Protocol has been established by the Ministry of AYUSH, Government of India, which indicates daily 45 min of Yoga session. Starting with *Mantra* (sacred syllables) chanting, *Sukshma Vyayama* (loosening exercise), practice of different postures in standing, sitting, supine and prone position were practiced (Table 1). Everyday session used to end with oath taking regarding the responsibility of health. This process was repeated for six days in a week for seven weeks.

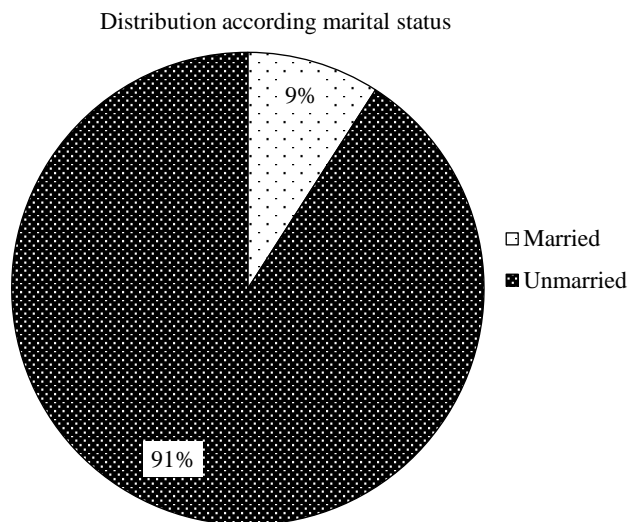
### **Demographic Observations**

Total 11 participants were enrolled between the ages of 20 and 30 years (Figure 1). All (100%) of the participants were female and were of Hindu origin. About 90% of them were unmarried whereas only 10% were married (Figure 2). About 73% of the participants were vegetarian whereas 27% of them were of mixed diet (Figure 3). Figure 4 shows the body mass index (BMI) status of all the participants. All of the study participants were post graduate students.

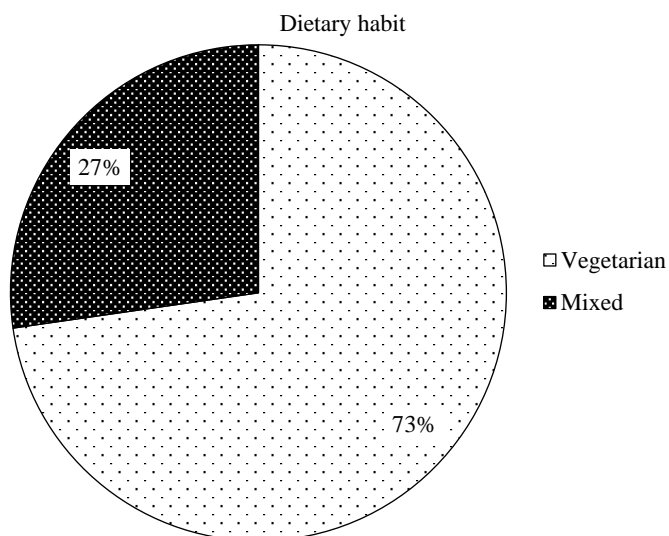
Figure 5 shows the overall assessment of participants from starting to the end of CYP practice and its effect on quality of sleep depending on PSQI which ranges from 21 that is, poor sleep quality to 5 or below that is, good sleep quality. Some common yoga protocol depicts in the Table 1.



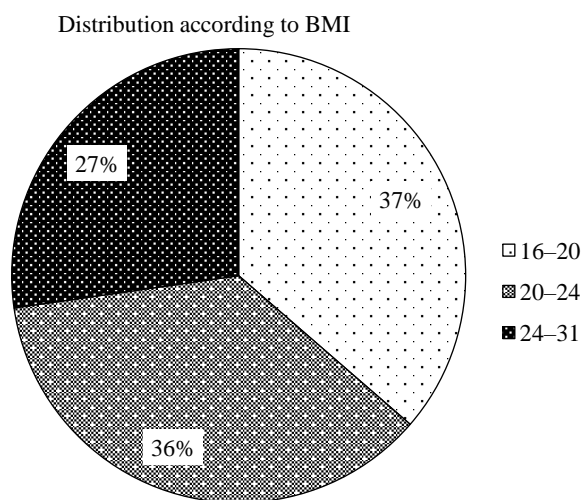
**Figure 1.** Distribution of participants according to age.



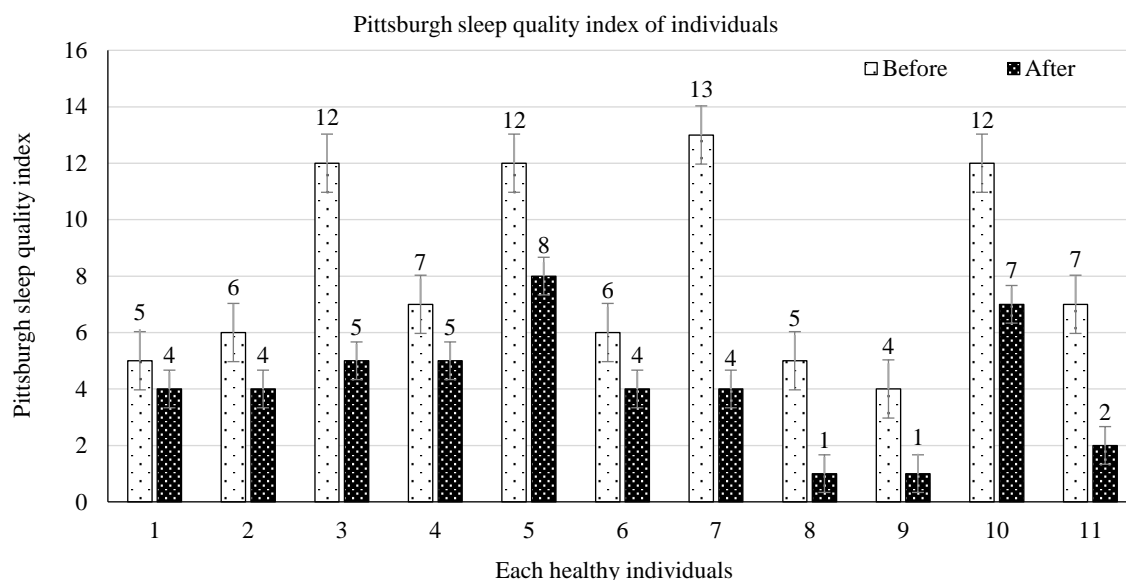
**Figure 2.** Distribution of participants according to marital status.



**Figure 3.** Distribution of participants according to dietary habit.



**Figure 4.** Distribution of participants according to BMI.



**Figure 5.** PSQI scale showing the assessment before and after CYP practice.

## RESULTS AND DISCUSSION

At 10 degree of freedom, 5% significant limit paired ‘t’ was 2.23. The observed ‘t’ value was 5.5 times the standard. Hence, there is no doubt that CYP has significant effect in improving quality of sleep ( $t=5.5$ ,  $P<0.001$ ) that is, highly significant statistically and clinically. Refer to Table 2 for the Pittsburgh sleep quality index (PQSI) score.

CYP starts with prayer to increase the integration among self and society [16]. Loosening practices helps to increase microcirculation, improves the muscle tone which can either be done in standing or sitting position [17]. It helps to remove joint stiffness and makes body and joints further flexible for the practice of *Asanas*.

### Standing Postures

*Tadasana* helps to bring stability in the body, helps to stretch the muscles and corrects improper posture [18]. *Vrikshasana* [19] helps to build the balance and postural stability and also improves the strength and endurance in the muscles of lower extremity [20]. *Pada-Hastasana* helps to manage stress and improve sleep. A study showed that around 80% of participants using an electronic device had poor sleep quality and practice of this *asana* helped to improve the same [21]. *Ardhachakrasana* helps to make the spine flexible and strengthen the muscles. This posture also reduces the inter-vertebral and intra-vertebral pressure which is produced due to improper and wrong postural habit [22]. *Trikonasana* [23] helps to make spine flexible, strengthen calf, thigh and waist muscles. It also helps to improve the capacity of lungs. Innes et al., stated that this posture alters the stress perception and improves mood and sleep pattern [24].

### Sitting Postures

*Bhadrasana* [25, 26] helps to keep body firm and calm the mind, eases dysmenorrhea and helps during pregnancy by adequate blood supply [21]. Due to the stretching effect on muscles such as adductor longus, quadratus femoris, etc., it helps in bringing back the position of pelvis and releases the extra pressure on lumbosacral vertebrae [27]. *Vajrasana*, the only *Asana* which can be practiced after meal aids metabolism; also helps to strengthen thigh and calf muscles [28–30]. *Ardha Ushtrasana* and *Ushtrasana* helps to strengthen neck and back muscles, increases blood circulation in lungs, cardiac region, and head [31]. *Shashakasana* helps to improve digestion and tone up reproductive organ, also reduces anxiety and stress [31]. *Uttana Mandukasana* [32] improves quality of life and boosts mental health [33]. *Vakrasana*, this spine twisting *Asana* increases spine flexibility and improves the function of pancreas [34].

### Prone Postures

*Makarasana* [35], is relaxing pose, indicated in stress and anxiety [36, 37]. *Bhujangasana* and *Shalabhasana* is beneficial in backache, bronchial problem [38] and also relieves sciatica pain [39].

### Supine Postures

*Setu Bandhaasna* helps to aid digestion and stretches abdominal organs and also increases blood circulation in brain. It also decreases stiffness of lower back muscles [40]. *Uttana Padasana* [40] and *Ardha Halasana* facilitates blood flow from lower extremities to pelvic region, helps in weight reduction [41] and eases constipation [42]. *Pavana Muktasana* helps in relieve from constipation, decreases abdominal bloating, improves digestion, and stretches muscles of pelvis [43]. *Shavasana* [44] release all kind of stresses and gives soothing effect to body and mind, relaxes psycho-physiological system [45–47]. *Kapalabhati* is practiced by sitting in any meditative posture. It helps in condition related to respiratory system and purify sinuses and also improves digestion [48, 49].

*Pranayama* included were *Nadi Shodhana* [50], *Shitali* [51–53], and *Bhramari* [54–57]. All these help in calming the nervous system, balancing stress level in body and mind, and improving concentration. *Dhyana* [58] helps to balance emotions in the body, keeps mind calm and quiet, increases concentration and rejuvenates body and mind [59].

Thus, from the above discussion, it can be summarized that CYP was developed keeping in mind that it should include all the systems of the body. Though, it was practiced for 45 minutes, all the included *Asanas* has role in most of the psycho-physiological ailments. This practice in general helps to stretch body muscles, increase blood circulation, decrease body tension and further decrease the problem present in the body and mind. The inhalation, exhalation and retention process helps in microcirculation in the brain, thus providing more oxygen and keeping it more attentive. One of the clinical trials has shown that daily practice of this also reduces free radicals. Yogic practices is not only helpful in relieving stress but also improves the antioxidant level in the body [60]. Therefore, all these processes helps to balance the hormonal level in the body which aids in proper and quality sleep.

**Table 1.** Common yoga protocol (CYP) [61].

Practices	Forms
Syllable chanting	संगच्छध्वं संवदध्वं, सं वो मनांसि जानताम्, देवा भागं यथा पूर्वे, सज्जानाना उपासते ॥ <i>saṅgacchadhvaṃ saṁvadadhvaṃ, saṁ vo manāṁsi jānatām</i> <i>devā bhāgaṃ yathā pūrve, sañjānānā upāsate ॥</i>
<i>Sukshma Vyayama</i> (Loosening exercise)	Neck movement, Shoulder movement, Trunk movement, Knee movement- three rounds for each movement
Standing postures	<i>Tadasana</i> (Palm tree posture), <i>Vrikshasana</i> (Tree posture), <i>Pada-Hastasana</i> (Hand to Feet posture), <i>Ardha Chakrasana</i> (Half Wheel posture), <i>Trikonasana</i> (Triangle posture)
Sitting posture	<i>Bhadrasana</i> (Auspicious posture), <i>Vajrasana</i> (Thunderbolt/Diamond posture), <i>Ardha Ushtrasana</i> (Half camel posture), <i>Ushtrasana</i> (Camel posture), <i>Sasakasana</i> (Hare posture), <i>Uttana</i> , <i>Mandukasana</i> (Stretched up-frog posture), <i>Vakrasana</i> (Spinal twist posture)
Prone postures	<i>Makarasana</i> (Crocodile posture), <i>Bhujangasana</i> (Cobra posture), <i>Salabhasana</i> (Locust posture)
Supine postures	<i>Setubandhasana</i> (Bridge posture), <i>Uttana Padasana</i> (Raised feet posture), <i>Ardha Halasana</i> (Half plough posture), <i>Pavana Muktasana</i> (Wind releasing posture), <i>Savasana</i> (Corpse/Dead body posture)
Breathing exercise	<i>Kapalabhati</i> (forceful breathing), <i>Nadi Sodhana/ Anuloma Viloma</i> (Alternate nostril breathing), <i>Sitali</i> (cooling breath), <i>Bhramari</i> (Bee humming)
Meditation	
<i>Shanti Patha</i>	ॐ सर्वे भवन्तु सुखिनः। सर्वे सन्तु निरामयाः। सर्वे भद्राणि पश्यन्तु। मा कश्चित् दुःख भाग्भवेत्॥ ॐ शान्तिः ! शान्तिः ! शान्तिः ॥ <i>Om Sarve Bhavantu sukhinah, Sarve Santu Niramayah, Sarve Bhadrani Pashyant, Maa Kaschit Dukha Bhagbhavet, Om Shanti, Shanti, Shantih.</i>

**Table 2.** Pittsburgh sleep quality index (PQSI) score.

Parameter	Mean		Mean difference	SD	SEM	t	df	P	R
	Before	After							
PQSI score	8.09	4.09	4	3.42	1.03	5.5	10	0.0003	HS

*PQSI: Pittsburgh sleep quality index*

## CONCLUSION

A single arm pilot study was conducted to evaluate the sleep quality in healthy individuals and the result calculated was  $P < 0.001$  which means the effect was highly significant statistically and clinically. This pilot study can be the base to carry out the work in larger population to see the further benefits based on subjective and objective criteria.

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Nil.

## Conflicts of interest

Nil.

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