



DEVELOPMENT AND VALIDATION OF YOGA MODULE FOR OBSTRUCTIVE SLEEP APNEA

Bhavish Singh	Scholar, Msc (Astanga Yoga), Department of Astanga yoga Lakulish Yoga University "Lotus view" opp.Nirma University,S.G. Highway, Chharodi, Ahmedabad – 382 481 Gujarat, India.
Dr. Vijaya Kumar PS*	Associate Professor, BAMS, MD(Yoga & rehab.), Msc(psy), PhD(Yoga), Department of Astanga yoga Lakulish Yoga University "Lotus view" opp.Nirma University,S.G. Highway, Chharodi, Ahmedabad – 382 481 Gujarat, India. *Corresponding Author
Sahana AU	Clinical psychologist, Msc (Clinical psychology),Department of Astanga yoga Lakulish Yoga University "Lotus view" opp.Nirma University,S.G. Highway, Chharodi, Ahmedabad – 382 481 Gujarat, India.
Shriya S	Scholar, Msc (Astanga Yoga), Department of Astanga yoga Lakulish Yoga University "Lotus view" opp.Nirma University,S.G. Highway, Chharodi, Ahmedabad – 382 481 Gujarat, India.

ABSTRACT

Background: Sleep is an essential component of human life because it provides for relaxation and recovery from the stresses of everyday living. Reduced sleep quantity or quality leads to sleep deprivation, which may offer indirect dangers by affecting cognitive and physical performance and raising the chance of motor vehicle and occupational accidents. Insomnia, chronic sleep debt, snoring, sleep apnea, circadian rhythm disturbances (including shift work syndrome), RLS, parasomnias, and uncommon diseases such as narcolepsy are the most common sleep disorders found in sleep clinics, according to experts. Obstructive Sleep apnea is a common disorder in which your breathing stops and starts periodically while you sleep. To determine the design and validation of an Integrated Yoga Module (IYM) for OSA patients. **Materials and Procedures:** The first phase - IYM for OSA - was created based on a survey of classic books and recently available research studies. The designed IYM was validated by 20 subject matter (yoga) experts in the second phase. Lawshe's formula was used to calculate the content-validity ratio (CVR). **Results:** Yoga practices were created for the OSA Integrated Yoga Module. The final Integrated Yoga Module featured yoga practises with CVR ≥ 0.5 that were assessed by 20 yoga experts and agreed in faculty group discussion. **Conclusion:** The yoga practices were designed and validated for IYM for OSA. By applying Lawshe's content validity criteria, 20 yoga professionals verified the IYM design.

KEYWORDS : Sleep deprivation, Insomnia, Chronic sleep debt, Snoring, Sleep apnea, Circadian rhythm disturbances (including shift work syndrome), RLS, Parasomnias, Narcolepsy, Integrated Yoga Module (IYM), OSA, Content-Validity Ratio (CVR).

INTRODUCTION**Obstructive Sleep Apnea:**

Sleep is a crucial element of human existence because it allows for relaxation and recuperation from the strains of daily life (1). Decreased sleep quantity or quality leads to sleep deprivation, which may pose indirect risks by impairing cognitive and physical function and increasing the likelihood of motor vehicle and occupational accidents (2). Based on expertise, the most frequent sleep disorders observed in sleep clinics include insomnia, chronic sleep debt, snoring, sleep apnea, circadian rhythm disruptions (including shift work syndrome), RLS, parasomnias, and unusual illnesses such as narcolepsy (3). Obstructive Sleep apnea is a common condition in which your breathing repeatedly stops and begins while you sleep. This can hinder your body from receiving adequate oxygen. Obstructive sleep apnea occurs when your upper airway repeatedly becomes clogged as you sleep, lowering or altogether halting airflow. This is the most prevalent kind of sleep apnea (4). Excessive daytime drowsiness, nocturia, morning headache, reduced libido, attention deficit, poor focus, neurocognitive impairment, irritability, and depression are prevalent in OSA patients, reducing their work efficiency and quality of life significantly (5). Excessive drowsiness is the most prevalent presenting symptom of OSA, but it is reported by only 15% to 50% of patients with OSA in the general population. However, many OSA individuals are asymptomatic. Patients with OSA who are asymptomatic, or whose symptoms are mild and represent no obvious danger to driving safely, can be treated with behavioural strategies such as weight loss and physical

activity (6). Sleep apnea can develop at any age, although the risk rises with age (4). The prevalence of obstructive sleep apnea is tentatively estimated to be 3% among women and 10% among men aged 30 to 49 years, and 9% among women and 17% among men aged 50 to 70 years (7). As you become older, fatty tissue in your neck and tongue might accumulate, increasing your risk of sleep apnea. Hormone levels can have an impact on the size and form of your face, tongue, and airway. People who have low thyroid hormone levels or high insulin or growth hormone levels are at a higher risk of sleep apnea. Sleep apnea may be passed down through families. Obesity is a common cause of obstructive sleep apnea. This syndrome can result in excessive fat deposits in the neck, which can restrict the upper airway. Obesity, on the other hand, is recognised by researchers as one of the most challenging public health issues of the 21st century. Sleep apnea is more prevalent in males than in women. Men are more likely than women to suffer from severe sleep apnea and to develop it at a younger age. Sleep apnea can be linked to a variety of conditions. Some variables, such as poor lifestyle choices, can be modified (4). In select patients with a BMI of less than 32, hypoglossal nerve stimulation is helpful. There are presently no viable pharmaceutical treatments available for OSA (6).

Risk For Osa:

Drinking alcohol and smoking, for example, can increase your risk of sleep apnea. Alcohol can relax the muscles in your mouth and throat, causing your upper airway to constrict. Smoking can cause inflammation in your upper airway,

affecting your ability to breathe (4). Obesity, enlarged tonsils, or hormonal changes can all constrict your airway and raise your risk of obstructive sleep apnea. (4). Increased tonsillar and adenoid tissue, as well as certain craniofacial anomalies (retrognathia and maxillary insufficiency), may potentially predispose to obstructive sleep apnea (8). Increased adipose tissue within the tongue and throat reduces upper-airway dimensions and increases the likelihood of airway collapse during sleep. Obstructive sleep apnea has been documented in more than 40% of people with a BMI greater than 30 and 60% of those with metabolic syndrome (9). Premenopausal women have a lower incidence of obstructive sleep apnea than older women due to progesterone stimulation of upper-airway muscles and ventilation (10). Higher androgen levels, on the other hand (as with testosterone supplementation and polycystic ovarian disease), may increase muscle mass in the tongue and aggravate obstructive sleep apnea (11). Obstructive sleep apnea is also more common in those with hypothyroidism or acromegaly (12). Even after accounting for BMI and other cardiovascular risk factors, obstructive sleep apnea is linked to an increased risk of cardiovascular disease such as hypertension, stroke, coronary artery disease, or heart failure (13). Furthermore, hypoxemia in individuals with obstructive sleep apnea is a risk factor for parasympathetic activation and bradyarrhythmias, as well as a predictor of cardiovascular events such as sudden cardiac death (14). Also, obstructive sleep apnea is linked to an increased risk of diabetes and glucose dysregulation, regardless of weight, as well as higher levels of total cholesterol, low-density lipoprotein cholesterol, and triglycerides and lower levels of high density lipoprotein cholesterol (15).

Lifestyle Modifications for Obstructive Sleep Apnea:

Adopting healthy lifestyle changes such as eating a heart-healthy diet, striving for a healthy weight via increased physical activity, giving up smoking, limiting alcohol use, and adopting excellent sleeping habits such as receiving the required amount of restful sleep can all help to avoid obstructive sleep apnea (16). Weight reduction counseling for overweight and obese individuals is recommended, as is avoiding drugs and substances that increase upper airway relaxation (e.g., alcohol, benzodiazepines, and opioids), and raising awareness of and offering countermeasures for the dangers of drowsy driving. (17). Weight loss of more than 10 kg may alleviate obstructive sleep apnea in more than 50% of people with moderate illness and improve cardiometabolic health (18). Medications and substances that relax muscles or reduce respiratory drive (for example, alcohol, benzodiazepines, and opioids) may aggravate obstructive sleep apnea and should be avoided or limited. (17). Considering this, there is an urgent need for alternative therapies to enhance function and quality of life in people with OSA. Yoga could be a highly potent non-pharmacologic therapy for OSA.

YOGA IN OSA:

Maintaining a healthy weight can help keep your airways open and lessen the symptoms of sleep apnea. Obese patients who lose just a few pounds may be able to avoid upper airway surgery or long-term CPAP therapy, according to research. In certain circumstances, losing weight helps cure sleep apnea. Cortisol levels rise in response to stress. Cortisol promotes a rise in belly fat, a loss in muscle mass, desires for fat and sugary foods, and can consequently contribute to obesity. Yoga has been shown in studies to help you manage stress, enhance your mood, reduce emotional eating, and build a network of support, all of which can aid with weight loss and maintenance. Yoga can also help you burn calories while increasing muscular build and tone. Sleep issues are frequently caused by stress and worry, but yoga may assist in calming your body, a process known as the relaxation response. The fight-or-flight reaction is the inverse of this. It also enhances regulation of the autonomic nervous system,

lowering the ease with which you can be woken. This may result in reduced blood pressure and levels of the stress hormone cortisol. Meditation may also raise melatonin (the sleep hormone), serotonin (a precursor to melatonin), lower heart rate, lower blood pressure, and activate brain regions that influence sleep. Similar changes occur in the body during the early phases of sleep. As a result, meditation can enhance sleep by triggering these modifications. A yoga based regimen can assist with stress-related issues like weight gain, anxiety, and sleeplessness. It may also assist you in being more conscious of your eating habits. Hence, yoga techniques such as asana, pranayama, bandha, kriyas, and dhyana may be able to help people fall asleep faster, sleep longer, and return to sleep after waking up in the middle of the night, hence increasing sleep quality and correcting sleep problems. Yoga activities such as Sukshma Vyayama, Kechari Mudra, and Sheetal Pranayama (using the tongue) may assist in alleviating OSA by activating the hypoglossal nerve and strengthening genioglossus strength. Yogic cleansing practices such as Vamana Dhauti/Kunjali Kriya or simple salt water gargling may aid in lowering fluid retention around the throat and therefore widening the airway lumen (19). Sleep apnea is connected with low blood oxygen saturation. Yoga's varied breathing routines help boost the oxygen levels in your body while clearing pollutants. Oxygen provides energy to the important organs, such as the brain and nerves. This is intended to give physiological healing advantages such as help with mindfulness by increasing attention and concentration. As a result, yoga minimises the number of sleep disruptions one may have. The purpose of pranayama is to bring your body and mind together. A 2017 research found that students who practised pranayama had better levels of awareness than those who did not. The same pupils also demonstrated improved emotional management. This was linked to the soothing impact of pranayama, which helps you to be more conscious (20). According to a 2013 study, 12 weeks of slow or fast pranayama increased executive function, which includes working memory, cognitive flexibility, and thinking abilities (21). The study also discovered that pranayama can enhance your perceived level of stress and reaction time. Furthermore, the study discovered that fast pranayama was connected with improved auditory memory and sensory-motor function. These advantages, according to the researchers, are related to the stress-relieving effects of pranayama. A part is also probably played by the increased oxygen intake, which energises brain cells.

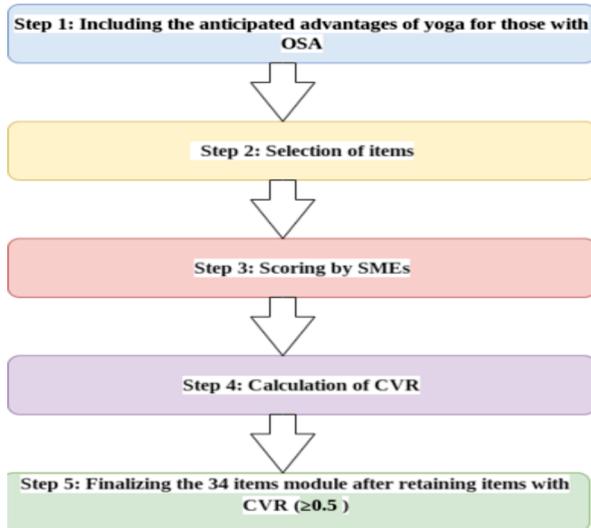
According to studies, pranayama might help you unwind and practice mindfulness. It has also been shown to help with a variety of physical health issues, including lung function, blood pressure, and brain function. Researchers examined how mindfulness meditation benefited 49 people with moderate sleep difficulties in a 2015 study published in JAMA Internal Medicine. The participants were randomly allocated to either meditation or sleep hygiene instruction for 6 weeks. The meditation group had fewer insomnia symptoms and decreased daytime weariness at the conclusion of the trial (22). A 2019 study found that pranayama helps persons with obstructive sleep apnea sleep better overall. The study also discovered that pranayama practice reduced snoring and daytime tiredness, suggesting advantages for better-quality sleep (23). Practising yoga has a favourable influence on the quality of sleep and general life. Yoga is a natural alternative to prescription sleep aids, which are frequently recommended to elderly people (24). In addition to having a direct impact on the oropharyngeal muscles, breathing patterns, and nasal and respiratory disorders, yoga also helps patients experience symptomatic relief by lowering risk factors including obesity, sedentary lifestyle, addictions, anxiety, and allergies, among others (25). Hence, there is an urgent need to standardise yoga treatment protocols for snoring and sleep apnea.

Validation:

A system, service, or product is validated using Lawson's content-validity ratio (CVR) to see if it complies with standards and specifications for its intended use (26). We came to the conclusion that there was a need for a tried-and-true international protocol for OSA because different investigators from all over the globe utilise a variety of techniques for OSA modules. As a result, the current validation research was organised and carried out.

MATERIALS AND METHODS:

The Integrated Yoga Therapy Module (IYM) for Obstructive Sleep Apnea was designed, validated, and tested for practicality as follows:



Step 1: Including the anticipated advantages of yoga for those with OSA

Obstructive sleep apnea sufferers' expectations were enlisted.

Table 1

ROLE OF YOGA IN OSA
1. To minimise nocturnal awakenings while improving sleep quality and efficiency.
2. To prevent the development of OSA in people who are prone to it.
3. Improved control of the hypoglossal nerve and upper respiratory muscle.
4. To improve the individual's everyday functioning and work performance.
5. Improving QoL through improved health-related decisions; weight management.
6. To avoid the onset of OSA-related health issues.
7. Reduce pharmaceutical adverse effects and medication reliance.
8. Improve cognition, memory, and mood in people with OSA.
9. It promotes profound rest and relaxation of the body and mind in order to speed up recovery.
10. Aids in the improvement of interpersonal connections and social engagement.
11. Promotes energy, cheerfulness, and freshness throughout the day.

Step 2: The researcher studied many yoga scriptures under the supervision of renowned yoga masters to understand the foundation of an integrated approach to yoga treatment to attain these aims. This was supported by the modern scientific understanding that all non-communicable diseases have a strong psychological component in addition to physical symptoms (27). Obstructive sleep apnea (OSA) is defined as

repeated collapse of the pharyngeal airway during sleep, resulting in significantly decreased (hypopnea) or total stoppage of airflow despite continued breathing attempts. These respiratory difficulties cause occasional blood gas alterations (hypercapnia and hypoxemia) as well as surges of sympathetic activity. Loud snoring is a common symptom of OSA, and the climax of a respiratory episode is usually coupled with a brief waking from sleep (arousal). As the patient oscillates between waking and sleep, these events cause a cyclical respiratory pattern and fragmented sleep. In extreme instances, respiratory episodes can occur more than 100 times per hour, with each event generally lasting 20-40 seconds (28). Numerous physiologic alterations related to ventilation and respiration occur during sleep (algorithm 1). A sleeping person's restricted mobility, diminished attentiveness, and passive demeanour are all indicators that they are in a calm resting state and are considered to be signs of sleep. Sleep is linked with a lower metabolic rate, a loss of the awake desire to breathe (29) and a concomitant decrease in ventilatory motor output to respiratory muscles, especially the upper airway (UA) muscle. Furthermore, the absence of the arousal desire to breathe makes sleep respiration critically dependent on the amount of chemoreceptor and mechanoreceptor stimulation, making upper airway blockage more likely (30). Some of the signs of sleep apnea might be aggravated by stress. Stress, in particular, is closely connected to poor sleep quality, including trouble falling asleep, insufficient deep stage sleep, and fragmented sleep. According to Wesper sleep expert and neuroscientist Chelsie Rohrscheib, PhD, people with obstructive sleep apnea already have trouble sleeping, and stress can exacerbate this condition and its symptoms. Despite the fact that there is no direct link between stress and obstructive sleep apnea, stress can raise your chance of contracting other diseases, which may then make you more likely to acquire the condition. Obesity, high blood pressure, and heart disease are among the problems discussed in a 2019 review published in the Journal of the American Heart Association. According to a 2017 research published in The Journal of Clinical Endocrinology & Metabolism, untreated obstructive sleep apnea might actually produce greater stress by depriving you of deep sleep, resulting in higher levels of the stress hormone cortisol. Reducing stress may also have some benefit on blood pressure, which is usually elevated in sleep apnea sufferers (31).

We then compiled the reversible remedial strategies provided in several scriptures (Patanjali Yoga Sutra, Hatha Yoga Pradipika, Hatharatnavali, Bhagavad Gita).The hatha yoga literature were used as the foundation for the creation of a need-based table of practises for long-term holistic development at all five parts of personality. Publications (books and papers) on yoga for OSA were also studied in order to compile a list of all practices employed in all of this research. This resulted in seventy - two practice items, which are listed in Table 2.

Table 2

YOGA PRACTICES	EXPECTED BENEFITS
Sukshma Vyayama	Sukshma Vyayama is the system of yogic practices that loosens your joints and removes the energy blockages. This system has a strong purifying effect, thus boosting the body's energy. They activate the subtle pranic body. Discipline the body-mind complex.
Āsana	It provides a variety of health benefits, including lowering blood sugar and blood pressure, as well as relieving fatigue and stress.

Pranayama	Pranayama reduces perceived stress, which in turn calms the nervous system. It increases oxygen uptake and reduces anxiety. It also improves sleep quality.
Breathing exercises	Breathing exercises can help rid the lungs of accumulated stale air, increase oxygen levels and get the diaphragm to return to its job of helping you breathe.
Loosening Exercises	Exercise can reduce OSA severity by reducing body weight and abdominal fat. Remove the lethargy and tardiness in the body. Develop the stamina of the body.
Bandhas	Helps us get lighter and relax the organs-muscles that are continuously pulled down by gravity. Bandha activates and tones the space between the abdominal organs and the diaphragm thereby rejuvenating respiration Practising interior locks helps in stimulating the rest and digest system of the body.
Shat Kriyas	To take toxic wastes out of the body. Balance tridoshas. Revitalisation of internal organs. To make the organs function properly, the toxic waste does not accumulate.
Meditation	It increases melatonin (the sleep hormone), serotonin (precursor of melatonin). Reduces heart rate, blood pressure and activates parts of the brain that control sleep.
Yogic Counselling	Helps to correct the notions of the individual and make smart and healthy lifestyle choices to revert back to a healthy status of mind-body and beyond.

Step 3:

Validation of the OSA module: A focused group discussion (FGD) with 20 subject matter experts (SMEs) was organised to validate the 72-item module. The SMEs included doctors of medicine in yoga, doctors of philosophy in yoga with at least 6-7 years of relevant experience, and yoga therapists (MSc in yoga) who have been continuously active in teaching the IAYT techniques to patients of all ages for more than 8 years.

The content validity was scored by these 20 SMEs on a three (0-2) point scale, with not necessary obtaining a 0, useful but not crucial receiving a 1, and vital receiving a 2. Following validation, the data were analysed using Lawshe's CVR (32).

Statistical Analysis:

Each of the 72 practices was evaluated by 20 SMEs. For all 72 items, Lawshe's CVR was computed using the formula $CVR = (N_e - N/2) / (N/2)$ (26), where N_e is the number of SME panellists who indicated "essential" and N is the total number of SME panellists. According to Lawshe's significance table, the value of CVR for 20 SMEs is equal to 0.5, meaning that all items with $CVR > 0.5$ are appropriate and necessary for the module.

RESULT:

Step 1: We gave the list of demands of patients with OSA to FGD; the final complete list of 11 items evolved is summarised in Table 1.

Step 2: The module's foundation is shown in Table 2 with five yogic personality domains and eight practice categories. Benefits associated with each component are also recorded.

Step 3: Table 3 displays the list of 72 things that evolved across all practice groups.

Table 3:

Practice List	CVR
Walking	-0.4
Jogging :Slow Jogging, Forward Jogging, Backward Jogging, Side Wise Jogging, Jogging with Jump	0.5
Forward and Backward Bending	0.6
Twisting	0.3
Side Bending	-0.4
Alternate toe touch	-0.2
Pawanmuktasana Kriya	0.9
Cycling	-0.1
Half Butterfly & Full Butterfly	-0.6
Chakki Chalana	0
Greeva Sanchalana (Neck Movements)	1
Skanda Sanchalana (Shoulder Movements)	0.7
Manibandha Sanchalana (Wrist Movements)	-0.9
Katie Sanchalana (Waist Movements)	-1
Janusanchalana (Knee Movements)	-0.9
Panda Sanchalana (Ankle Movements)	-1
Ankle Stretch Breathing	-0.6
Tiger Breathing	0.9
Shashankasana Breathing	0.5
Bhujangasana breathing	0.9
Setu Bandhasana Breathing	0.8
Suryanamaskar (11 Dynamic & 1 Slow)	1
Tadasana	-0.6
Ardhakati Chakrasana	0.2
Ardha Chakrasana	0.8
Padahastasana	0.2
Trikonasana	0.4
Parivrtta Trikonasana	0.5
Virabhadrasana-1	0.2
Vrikshasana	0.1
Baddha Konasana	-0.6
Gomukhasana	-0.2
Janu Shirshasana	0.2
Paschimottanasana	0.8
Ustrasana	0.9
Balasana	-0.6
Shashankasana	0
Bhunamanasana	0.4
Vakrasana	-0.1
Ardha Matsyendrasana	0.5
Simhasana Garjanasana	0.9
Makarasana	-0.2
Bhujangasana	1
Ardha Shalabhasana	0.5
Naukasana	0.3
Dhanurasana	0.8
Uttanpadasana	0.5
Halasana	0.9
Sarala Matsyasana	0.7
Sarvangasana	0.9
Setubandhasana	1
Viparita karani with wall support	0.2
Shavasana	0.5
Nadishuddhi Pranayama	0.1
Bhastrika	0.2
Bhramari	0.6
Ujjayi	1
Sectional Breathing	0.3
Surya Anuloma-Viloma	-0.9
Jalandhara Bandha	1
Uddiyana Bandha	-0.3

Cyclic Meditation	-0.4
IRT	0.7
QRT	0.7
DRT	0.8
MSRT	-0.4
Kapalbhati	-0.2
Jal Neti	0.6
Sutra Neti	0.5
Vaman Dhauti	0.9
LSP	0
Trataka	-0.2

CVR was determined for all 72 first practices listed. 34 yoga practices [Table 4] with a CVR of 0.5 were included in the planned IYM. Other practices, such as diet, yogic counselling, and devotional sessions, were addressed and accepted by all attendees at a faculty group discussion (FGD). As a result, they were also featured in IYM.

Table 4: The IYTM practices with content validity ratio ≥ 0.5 and focused group discussion approved practices

Practice List	CVR
Jogging	0.5
1.Slow Jogging	
2.Forward Jogging	
3.Backward Jogging	
4.Side Wise Jogging	
5.Jogging with Jump	
Forward and Backward Bending	0.6
Pawanmuktasana Kriya	0.9
Greeva Sanchalana (Neck Movements)	1
Skanda Sanchalan (Shoulder	0.7
Tiger Breathing	0.9
Shashankasana Breathing	0.5
Bhujangasana breathing	0.9
Setu Bandhasana Breathing	0.8
Suryanamaskar (11 Dynamic & 1 Slow)	1
Ardha Chakrasana	0.8
Parivrtta Trikonasana	0.5
Paschimottanasana	0.8
Ustrasana	0.9
Ardha Matsyendrasana	0.5
Simhasana Garjanasana	0.9
Bhujangasana	1
Ardha Shalabhasana	0.5
Dhanurasana	0.8
Uttanpadasana	0.5
Halasana	0.9
Sarala Matsyasana	0.7
Sarvangasana	0.9
Setubandhasana	1
Shavasana	0.5
Bhramari	0.6
Ujjayi	1
Jalandhara Bandha	1
IRT	0.7
QRT	0.7
DRT	0.8
Jal Neti	0.6
Sutra Neti	0.5
Vaman Dhauti	0.9
Diet	Approved by FGD
Yogic Counselling	Approved by FGD
Devotional Sessions- Bhajan And Mantra	Approved by FGD

DISCUSSION:

This study created a verified integrated yoga module in order to provide a standard yoga protocol for OSA. Four processes were taken to determine the content authenticity. After anticipating the benefits of yoga for persons suffering with

OSA on physical, mental, emotional, spiritual, and behavioural dimensions. Yoga techniques were classified into eight groups. Following that, 72 genuine yoga practices were chosen and evaluated by 20 subject matter experts in a focused group discussion meeting. The CVR was then computed to generate the final list by keeping all entries with CVR > 0.5 . Patients and clinicians are usually hesitant to use long-term pharmacological therapy for sleep difficulties owing to worries about dependency, tolerance, and adverse effects. As a result, non-pharmacological remedies such as psychological therapy, yoga, and relaxation techniques are commonly investigated. For this reason, yoga has been regarded as a complementary treatment or as the sole therapeutic option. Addition of regular Yoga exercises in the daily routine of elderly people can help to achieve good sleep quality as well as improve the QOL. Many studies have demonstrated yoga to be beneficial in the prevention and treatment of numerous ailments, with no noticeable negative effects. Yoga practices having a CVR of less than 0.5 were removed from IAYM. The explanation for their CVR of 0.5 may be that these activities are not targeted and have no direct influence on the OSA population. The selection of yoga techniques is based on the notion of physical activity as well as mental relaxation. Few works on Hatha yoga, however, place a greater focus on promoting health through various yogic practices. Yoga has been shown to help ease symptoms and lower risk factors for developing sleep apnea and snoring through weight loss and breathing activities that help restore pharyngeal muscle tone. Yoga's goal is to achieve bodily health, psychological well-being, and spiritual peace. Yoga practices promote profound relaxation to internal body systems, which is necessary for the system to return to normal functioning. Yoga also increases the mind's drive to maintain a healthy lifestyle. Because of this, it is a multidimensional, nonsurgical, nonmedical, alternative, and indigenous approach to a similarly diverse medical issue. IYM is unique from other yoga modules as it's an innovative mind-body method that combines physical movements (asana), breathing exercises (pranayama), bandhas (energy locks), cleansing practises (shat kriyas), meditation and relaxation techniques all rolled into one multidimensional discipline. Numerous positive mental and physical impacts of this integrated traditional technique have been traditionally recognised.

CONCLUSION:

The yoga routines for IYM were created based on the knowledge of yoga masters and yoga books.

By applying Lawshe's content validity criteria, 20 yoga professionals verified the IYM design.

Source of funding

None

Acknowledgment

We would like to thank all the experts for participating in this research study and providing their expert opinion.

Conflict of interest

None

REFERENCES:

- Nithya, R., & Mahendran, P. (2018). Efficacy of integral yoga training on apnea: Hypopnea index, quality of life and executive functions of adults with obstructive sleep apnea syndrome. *IAHRW International Journal of Social Sciences Review*, 6(5), 832-835.
- Luyster FS, Strollo PJ Jr, Zee PC, Walsh JK. Sleep: a health imperative. *Sleep* 2012;35(6):727-734.
- Ranganathan, L., & Ramakrishnan, N. (2014). Yoga and sleep: Is there a scientific link?. *Indian Journal of Sleep Medicine (IJSM)*, 9(3). <https://www.nhlbi.nih.gov/health/sleep-apnea>
- Bradley TD, Floras JS (2009) Obstructive sleep apnoea and its cardiovascular consequences. *Lancet* 373(9657):82-93.
- Gottlieb, D. J., & Punjabi, N. M. (2020). Diagnosis and management of obstructive sleep apnea: a review. *Jama*, 323(14), 1389-1400.

7. Peppard PE, Young T, Barnet JH, Palta M, Hagen EW, Hla KM. Increased prevalence of sleep-disordered breathing in adults. *Am J Epidemiol* 2013; 177: 1006-14.
8. Dempsey JA, Veasey SC, Morgan BJ, O'Donnell CP. Pathophysiology of sleep apnea. *Physiol Rev* 2010; 90: 47-112.
9. Drager LF, Togeiro SM, Polotsky VY, Lorenzi-Filho G. Obstructive sleep apnea: a cardiometabolic risk in obesity and the metabolic syndrome. *J Am Coll Cardiol* 2013;62: 569-76.
10. Bayliss DA, Millhorn DE, Gallman EA, Cidlowski JA. Progesterone stimulates respiration through a central nervous system steroid receptor-mediated mechanism in cat. *Proc Natl Acad Sci U S A* 1987; 84: 7788-92.
11. Lin TY, Lin PY, Su TP, et al. Risk of developing obstructive sleep apnea among women with polycystic ovarian syndrome: a nationwide longitudinal follow-up study. *Sleep Med* 2017;36:165-9.
12. Ozcan KM, Selcuk A, Ozcan I, et al. Incidence of hypothyroidism and its correlation with polysomnography findings in obstructive sleep apnea. *Eur Arch Otorhinolaryngol* 2014;271:2937-41.
13. Somers VK, White DP, Amin R, et al. Sleep apnea and cardiovascular disease: an American Heart Association/American College of Cardiology Foundation scientific statement from the American Heart Association Council for High Blood Pressure Research Professional Education Committee, Council on Clinical Cardiology, Stroke Council, and Council on Cardiovascular Nursing in collaboration with the National Heart, Lung, and Blood Institute National Centre on Sleep Disorders Research (National Institutes of Health). *Circulation* 2008;118:1080-111.
14. Gami AS, Olson EJ, Shen WK, et al., Obstructive sleep apnea and the risk of sudden cardiac death: a longitudinal study of 10,701 adults. *J Am Coll Cardiol* 2013; 62:610-6.
15. Tasali E, Ip MS. Obstructive sleep apnea and metabolic syndrome: alterations in glucose metabolism and inflammation. *Proc Am Thorac Soc* 2008; 5: 207-17.
16. <https://www.nhlbi.nih.gov/health/sleep-apnea>
17. Veasey SC, Rosen IM. Obstructive sleep apnea in adults. *New England Journal of Medicine*. 2019 Apr 11;380(15):1442-9.
18. Hudgel DW, Patel SR, Ahasic AM, et al. The role of weight management in the treatment of adult obstructive sleep apnea: an official American Thoracic Society clinical practice guideline. *Am J Respir Crit Care Med* 2018; 198(6): e70-e87.
19. Moovenhan, A., & Nivethitha, L. (2021). Can yoga play a role in improving the health-related status of patients with obstructive sleep apnea? *International Journal of Health & Allied Sciences*, 10(1), 91.
20. Shastri, V. V., Hankey, A., Sharma, B., & Patra, S. (2017). Investigation of Yoga Pranayama and Vedic Mathematics on Mindfulness, Aggression and Emotion Regulation. *International journal of yoga*, 10(3), 138–144. <https://doi.org/10.4103/0973-6131.213470>
21. Sharma, V. K., M. R., S. V., Subramanian, S. K., Bhavanani, A. B., Madanmohan, Sahai, A., & Thangavel, D. (2014). Effect of fast and slow pranayama practice on cognitive functions in healthy volunteers. *Journal of clinical and diagnostic research : JCDR*, 8(1), 10–13. <https://doi.org/10.7860/JCDR/2014/7256.3668>
22. Black DS, O'Reilly GA, Olmstead R, Breen EC, Irwin MR. Mindfulness Meditation and Improvement in Sleep Quality and Daytime Impairment Among Older Adults With Sleep Disturbances: A Randomized Clinical Trial. *JAMA Intern Med*. 2015;175(4):494–501. doi:10.1001/jamainternmed.2014.8081
23. Mitra, M. (2019). Effect of oropharyngeal exercises and Pranayama on snoring, daytime sleepiness and quality of sleep in patients with moderate obstructive Sleep Apnea Syndrome.
24. Bankar, M. A., Chaudhari, S. K., & Chaudhari, K. D. (2013). Impact of long term Yoga practice on sleep quality and quality of life in the elderly. *Journal of Ayurveda and integrative medicine*, 4(1), 28–32. <https://doi.org/10.4103/0975-9476.109548>
25. Kumar, V., Malhotra, V., & Kumar, S. (2019). Application of standardised yoga protocols as the basis of physiotherapy recommendation in treatment of sleep apneas: moving beyond pranayamas. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 71(1), 558-565.
26. Global Harmonisation Task Force - Quality Management Systems - Process Validation Guidance. *GHTF/SG3/N99-10*. 2004;2:3.
27. Eckert, D. J., & Malhotra, A. (2008). Pathophysiology of adult obstructive sleep apnea. *Proceedings of the American Thoracic Society*, 5(2), 144–153. <https://doi.org/10.1513/pats.200707-114MG>
28. UpToDate. (n.d.). UpToDate. Retrieved October 16, 2022, from <https://www.uptodate.com/contents/pathophysiology-of-upper-airway-obstruction-in-obstructive-sleep-apnea-in-adults/abstract/5>
29. Dempsey, J. A., Veasey, S. C., Morgan, B. J., & O'Donnell, C. P. (2010). Pathophysiology of sleep apnea. *Physiological reviews*, 90(1), 47-112.
30. Skatrud, J. B., & Dempsey, J. A. (1983). Interaction of sleep state and chemical stimuli in sustaining rhythmic ventilation. *Journal of Applied Physiology*, 55(3), 813-822.
31. *Stress and Sleep Apnea: Is There a Link?* (n.d.). WebMD. Retrieved October 15, 2022, from <https://www.webmd.com/connect-to-care/sleep-apnea/is-there-a-link-between-sleep-apnea-and-stress#:~:text=Sleep%20Apnea%20and%20Stress,symptoms%20of%20sleep%20apnea%20worse>.
32. Lawshe CH. A quantitative approach to content validity. *Pers Psychol*. 1975;28:563–75.