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The Efficacy of Yogic Intervention on Insomnia Disorder

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Abstract

Previous studies showed that insomnia disorder is increasing by the rate of 5-10% in Indian population and its prevalent therapeutic/preventive measures have been found fragile. The objective of the current study was to assess the efficacy of yogic intervention on insomnia disorder. For this, 30 insomniac college students (13 boys and 17 girls) with global score 5 or more in Pittsburgh Sleep Quality Index Scale (PSQI) were sampled from University of Patanjali, Haridwar and recruited purposively after their written consent. It was hypothesized that University students would overcome the insomnia disorder after the YI. PSQI Scale standardized by University of Pittsburgh (Reliability: and Validity: 0.70) was used to measure baseline and post intervention intensity of sleep quality index. The YI comprised of selected poses, breath regulations, concentration, meditations and dietary prescription was administered among the participants for 15 days (From 10 to 25 April 2018) at University Hostel. Computed factor-wise and one aggregate paired t-tests by using SPSS showed significant reduction ($p<0.05$) in insomnia disorder of the participants after YI.

Keywords: Insomnia; Pittsburgh sleep quality index; Poor sleepers; Yogic Intervention (YI)

Introduction

A wide range of research work has been carried out on Insomnia disorders [1-3]. Additional studies have expanded on this research base and provided further empirical support for understanding the Diagnostic Statistical Manual (DSM-V) personality disorders in terms of the Five Factor Model domains [4]. Goldberg studied the big five model includes extraversion, agreeableness, conscientiousness, emotional stability (neuroticism) and openness (intellect). Under which neuroticism shows correlation with insomnia cases. Neuroticism identifies certain people who are more prone to stress and psychological disorders. The tendency of experiencing unpleasant emotions easily, such as anger, anxiety, depression etc. affects the degree of neuroticism and impulse control [5-7]. In the insomnia identity study, it reports under the research work of shows that insomnia shows increasing traits of neuroticism and low scores suggesting insomnia identity to have a meaningful clinical target [1,2].

The details of the analysis guide us for the future research works on CAM therapies for sleep disorders [8,9]. Professor Randeep Guleria, HoD of Pulmonary and Sleep disorders in All India Institute of Medical Sciences (AIIMS), said sleep disorders at present affect 5%-10% population in India with increasing prevalence as people get old. With the increasing prevalence of insomnia, the awareness among the Indians for the recognition of insomnia disorders has also increased with referrals for insomnia reflecting changing diagnosis techniques and patient awareness [10].

The rate of magnitude and intensity in the research work on the efficacy or effect of YI showed rise in the 20th century. Yoga is a multicomponent practice which is affecting in reducing the hyperarousal in the person statistically showing significant improvements in the sleep efficiency, total sleep time, onset latency and wake time after sleep onset, number of awakenings and the sleep quality measures after completing the protocol as compared with the pre-treatment values [11]. Insomnia is the perception or complaint of inadequate or poor quality of sleep because of difficulty in falling asleep. (American Psychiatric Association; DSM-V, 2013) Insomnia disorder is a state of hyperarousal experienced throughout the day. The hyperarousal is explained in the cognitive and physiological mechanism model of insomnia.

Objective of the Study

The objective of the study was to find the efficacy of YI on the insomnia disorder of university students.

Significance of the Study

This research work was needed to show the effect of yoga in insomnia cases. As the trending need of this century is to find effectual treatment with least side effects. The effect of yoga therapy on insomnia includes yogic asanas/poses, breath regulation (Pranayama), meditation and includes diet therapy in insomnia cases of the students. It is also explained that the 7 components will make significant positive outcome after the YI.

Expected Outcome of the Study

The intensity and time duration of sleep is expected to improve after YI. Further the protocol of YI may benefit to cure the cause of insomnia and this procedure of YI for 15 days may give the significant positive improvement in the post data collection.

Statement of the Problem

The present study targets to find the effect of YI in insomnia disorder cases among students studying in the university.

Hypothesis

Ho: There is no significant difference in the level of insomnia among students through within 15 days.

H1: The significant reduction in the level of insomnia among students through YI within 15 days.

Literature Review

Insomnia and CAM

Complementary alternative therapies (CAM) studies shows that logistic association between insomnia and CAM therapies serves as a guide to diagnose insomnia [12]. It was found that younger respondents with higher education were more likely to use CAM to treat insomnia or trouble sleeping. It was found that 60.7% of respondents told a conventional medical practitioner that they were using a CAM therapy for insomnia or trouble sleeping. This is higher than an estimate of the number of individuals who told their conventional medical practitioners that they are using a CAM therapy in general based on a previous survey.

Finally, the high use of biologically based therapies and mind-body therapies to treat insomnia or sleeping problems is new and useful information. It was also observed that most respondents using relaxation techniques found these therapies helpful for managing their insomnia or sleep troubles. Together the data was taken to justify further research on the efficacy of these CAM therapies to treat sleeping disorders such as insomnia.

Insomnia and meditation

There are many research studies done in the insomnia cases where mediation is used as a medium for treating insomnia [13]. Mindfulness meditation proved to be the healthy treatment for the adults in chronic insomnia [14].

Insomnia and breath regulation (Pranayama)

Researchers in yoga with different psychiatric patients show the possibility that the yoga intervention to achieve mental discipline and to control the specific psychiatric symptoms: anxiety, depression and insomnia.

Insomnia and sudarshan kriya

One of the specific forms of breathing exercises is the Sudarshan kriya yoga comprises of four breathing exercises includes Ujjayi, Bhastrika, om chanting and Sudarshan kriya in the cyclical controlled breathing practice that provides relief from insomnia.

Insomnia and transcendental meditation

The study by Donald E Miskiman in the article "The treatment of insomnia by the Transcendental meditation program" results in the findings that there is the significantly shorter time taken to fall in sleep after the analysis of the pre-post data of transcendental meditation [15].

Insomnia and lifestyle modification with diet

In the article "Lifestyle and quality of life in colorectal cancer survivors" in 2011 it showed the results that the physical activity in lifestyle changes shows the lower insomnia including adding food like fruits and vegetable in the diet [16].

Insomnia and yoga

The article on "Treatment of chronic insomnia with yoga: a preliminary study with sleep-wake diaries" shows the good evidence that through the pre-post data taken after the protocol significant improvements were seen in the factors of sleep [11].

Insomnia and psychological therapies

The psychological therapies produce considerable improvement and enhancement in both the sleep patterns and subjective sleep. Sleep onset active treatments were all superior to placebo therapies showing the significant changes on the sleep after the psychological therapies induced to the patients suffering from insomnia [17].

Concept of terms and variables

Meaning of insomnia disorder: Insomnia may be explained as a problem related to sleeping wake disorder. In this report, factors relating to the sleep disorder are discussed in detail. Insomnia may be defined under the circumstance of people having trouble falling asleep for long duration of time or falling asleep or both. Insomnia is the hyperarousal experienced throughout the 24 hours of the day.

Types of insomnia disorder: Insomnia may be categorized into two acute (primary) and chronic disorder. Acute insomnia disorder is the short-term period whereas the chronic disorder can last for a month or longer period of time.

There are 3 types of primary insomnia that are:

1. Psychophysiological insomnia
2. Idiopathic insomnia
3. Paradoxical insomnia [18]

But primary insomnia term has been exempted from the Diagnostic and Statistical Manual for Psychiatric disorder, 5th edition. text revision (DSM-V, 2005) and is referred to as insomnia disorder. (American Psychiatric Association; DSM-V, 2013). The insomnia disorder comes under the classification of sleep wake disorders which is for use of mental health and medical doctors. In the sleep wake disorders comes the 10 disorder groups: insomnia disorder is one of them. Individuals with this disorder have problems related with sleep-wake complaints regarding dissatisfaction in:

- Quality of sleep
- Time of sleep
- Amount of sleep

Resulting in daytime dysfunction as core features of insomnia disorder [19]. Insomnia has been changed to a single major disorder called chronic insomnia disorder, and a short-term insomnia disorder for symptoms present for short period of time less than a month.

Causes of insomnia disorder

Causes or conditions that result in insomnia are:

- Psychological stress
- Chronic pain
- Heart failure
- Hyperthyroidism

- Heartburn
- Restless leg syndrome
- Menopause
- Certain medications
- Drugs such as Caffeine, Nicotine, Alcohol [20]

Symptoms of insomnia disorder

- Difficulty falling asleep, including difficulty finding a comfortable sleeping position.
- Waking during the night and being unable to return to sleep
- Feeling unrefreshed upon waking
- Daytime sleepiness, irritability or anxiety

Sleep-onset insomnia is difficulty falling asleep at the beginning of the night, often a symptom of psychological disorders. Delayed sleep phase disorder can be mistakenly treated as insomnia, as sleep onset is delayed to much later than normal [21,22]. It is common for patients who have difficulty falling asleep to also have nocturnal awakenings with difficulty in falling back to sleep. Two-thirds of the patients wake up in the mid-night, with more than half having trouble falling back to sleep after a mid-night awakening [23]. Early morning awakening is an awakening occurring earlier than the desired with an inability to go back to sleep, and before total sleep time reaches 6 or 6.5 hours. Early morning awakening is often due to depression, stress, psychological disorders [24].

Mechanism of insomnia disorder

The mechanism of disorder is explained with the two models:

- The cognitive model
- The physiological model

The cognitive model explains the process that how there is disruption in sleep due to worry and life stresses creating an acute insomnia disorder especially when we initiate sleep or return back to sleep after awakening. Another model of mechanism of insomnia disorder, physiological model of insomnia states that primarily hyperarousal is due to the physiological or neurophysiological factors in the body. The cause of insomnia may be a side effect of any disease or may be due to psychological stress disorder or both the reasons. This mechanism of insomnia is associated with wide range of emotional, social, and physical domains.

Measuring of insomnia disorder

Various scales are used in measurement of insomnia cases or the sleep quality all around the world. Some are Epworth sleepiness Scale for children and adolescents (ESS-CHAD), Pittsburgh sleep quality index (PSQI) [25] e.g. Brief insomnia questionnaire etc. Murray Johns has developed a questionnaire on Epworth sleepiness scale (ESS) for children and adolescents' ESS-CHAD This is questionnaire is based on 3 scale models where focus has been given only for the children [26]. In this study, Pittsburgh sleep quality index was used as a tool for measuring insomnia cases, which comprises of 10 questions out of which 9 questions were taken in consideration 1 question regarding roommate partner/s which has been exempted from the questionnaire used further the questionnaire has seven components in it. And the scoring of each component ranged from '0-3' and at last the global score is the sum of the scores of the seven components ranged from '0-21'. The score of 0 shows no severity and 21 shows severity in the case of sleeping habits.

Management of insomnia cases

There are many ways by which the insomnia disorder can be diagnosed but the best method is the one that has no-side effects of its own. Yoga therapy is one of the methods by which the main causes of insomnia can be removed effortlessly. Research studies prove that Yoga targets the unmanaged stress one of the main components of chronic disorder such as insomnia [27]. Yoga's therapeutic potential has been explored in a growing number of randomized controlled trials (RCTs) to date [11].

Methods

Sampling

The sample in this study is determined by using random sampling. The study was conducted in the month of April 2018 at University of Patanjali out of which 30 students with the insomnia disorder were recruited. The 30 subjects gave informed consent for their participation in the study.

Participants

A total of 30 participants were recruited from the University of Patanjali located in North India. The students of the university of both the genders with complaints of insomnia, as described under Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V, 2005) who were willing to give consent and to comply with all the study's protocol and procedures.

Inclusion criteria

The inclusion criteria of the study are as follows:

- Age range between 20-26 years.
- All participants were healthy.

Exclusion criteria

The screening process was designed to exclude:

- Individuals suffering from psychological and/or medical conditions known to affect sleep or the mental state of the person.
- Incomplete questionnaire.
- Participants who are not willing to participate in the study.
- No substance history.

Research design

This is the pre-post design in which the 30 participants were assessed in pre and post by using PSQI Questionnaire.

Details of tools and tests

The method used in studying the efficacy of YI in insomnia cases is done by PSQI on 30 students of the university. As per PSQI relating to usual sleep addiction during the post 1 month. These questions are considered in this paper also. The PSQI measures several different aspects of sleep, offering seven components score and one global score.

The component scores consist of subjective sleep quality, sleep latency (i.e., how long it takes to fall asleep), sleep duration, habitual sleep efficiency (i.e., the percentage of time in bed that one is asleep), sleep disturbances, use of sleeping medication, and daytime dysfunction. In the questionnaire each component score ranges from

0-3 and the global score ranging from 0-21. The 0 shows no severity and 21 shows severity in the sleeping habits. The PSQI has a sensitivity of 89.6% and specificity of 86.5% for identifying cases with sleep disorder, using a cut-off score of 5.

Data generation procedure

The method used to create the data was based on the significance of the Pittsburgh insomnia sleep index. Participants were assessed with pre-data then yogic protocol was intervened for 15 days after that post data was collected from the 30 students recruited for the study from the university. It indicates the difference present in the 7 component factors of the questionnaire in pre-post YI. The primary objective is to study the effect of YI on student suffering from insomnia. And the specific objective is to study the seven components of the PSQI questionnaire and hereby differentiating them comparing the pre and the post data collection.

The procedure of Yogic protocol under the insomnia cases was intervened in systematic way for 15 days. The YI is categorized into 4 types and described in Table 1.

Duration: 15 days (10 to 25 April 2018)		
Activities	**Description**	**Time interval**
Somatic (postures)	Loosening sensation with mild bhastrika, Spinal sensation, Shasankasana, Bhujangaasana, Makarasana, Inversions-vipreetkarni	20 min
Pranic (pranayama)	nostril breathing from each starting from the left Crown breath, Alternate nostril, Kapalbhati, Bhramari, Ujjayi, Kaki mudra	20 min
Concentration & Meditation	Atmabodha and Tattva Bodha, Yoga nidra, Nada/mantra, Gayatri mantra	20 min
Dietary therapy	Easily digestible balanced diet, Drink plenty of water Fruits and vegetables	Daily

Table 1: Yogic intervention (YI) details in brief: Session was conducted from Monday to Friday in evening 5 pm to 6 pm. (leaving one day for self-practice).

Data analyses

The data analysis taken was done with the help of SPSS Software where the paired t test of the total global score and the factor wise 7 components showed the positive significant improvement after the YI. In all the seven components the value of t has significant positive result.

Results

Based on the graphical representation and the graph, the mean of pre PSQI global score is 9.17 and the post PSQI global score is 2.20. The SD of the pre PSQI global score is 2.949 and the post PSQI global score is 1.186. The paired t test value was used to assess the significance of the hypothesis. The obtained value of t is 13. 349.

Since the obtained t value is more than the table value $p \leq 0.001$ for df=29, hence the null hypothesis is rejected. Further each component mean and SD are compared in the pre and post data (Table 2). This shows that there is a significant improvement in PSQI by Yogic intervention.

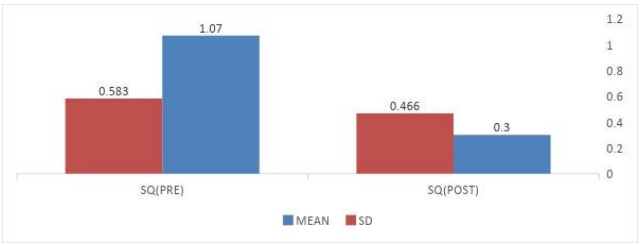
Stat. measures State	**Mean ± SD**							
	SQ	**SL**	**SD**	**SE**	**SDIS**	**SM**	**DD**	**Total**
Pre-data	1.07 ± 0.583	1.80 ± 0.961	1.30 ± 0.659	1.73 ± 1.015	1.53 ± 0.730	0.27 ± 0.583	1.47 ± 1.042	9.17 ± 2.949
Post data	0.30 ± 0.466**	0.40 ± 0.498**	0.87 ± 0.434**	0.80 ± 0.484**	1.10 ± 0.651**	0.001 ± 0.001**	0.93 ± 0.254**	2.20 ± 1.186**

** Denotes $p \leq 0.001$ for the two-tailed test (n=30).

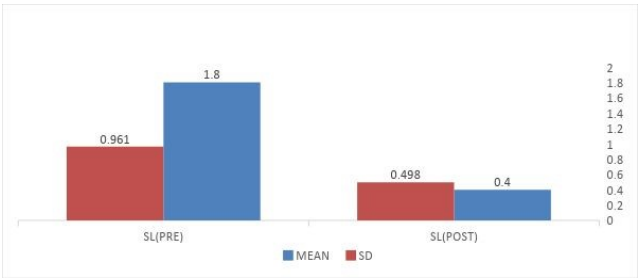
*SQ: Sleep Quality, SL: Sleep Latency, SD: Sleep Duration, SE: Sleep Efficiency, SDIS: Sleep Disturbance, SM: Sleep Medication, DD: Daytime Dysfunction, Total: Global Score.

Table 2: Comparison of mean and standard deviation (SD) for the pre-post data of the PSQI factors and global score.

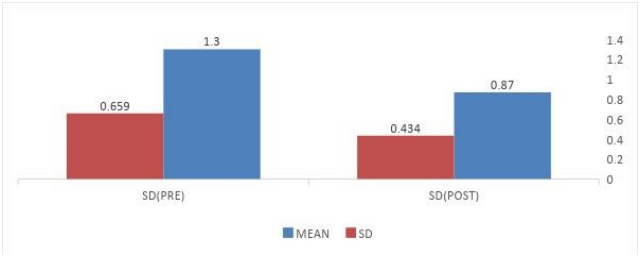
The graphical representation shows the change in the pre and post data mean and SD of all the seven components as well as the total global score of the PSQI Questionnaire (Graphs 1-8).



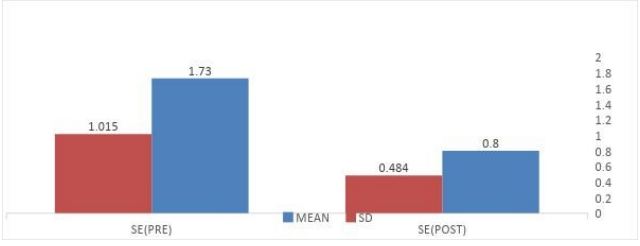
Graph 1: Comparison of pre-post data in the sleep quality (SQ) component of mean and Standard deviation (SD)



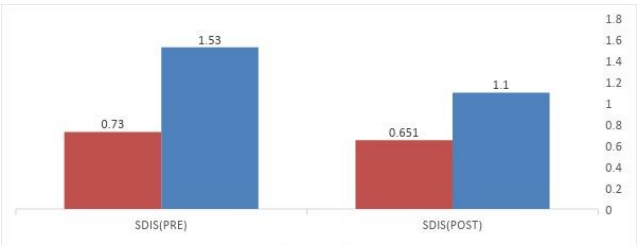
Graph 2: Comparison of pre-post data in the sleep latency (SL) component of mean and SD.



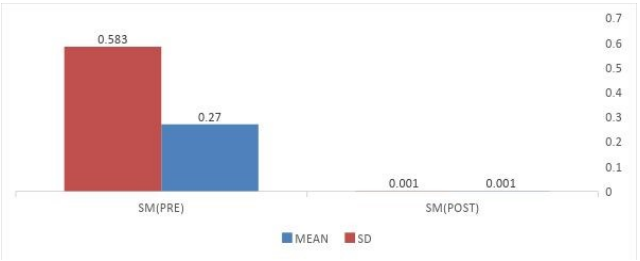
Graph 3: Comparison of pre-post data in the sleep duration (SD) component of mean and SD.



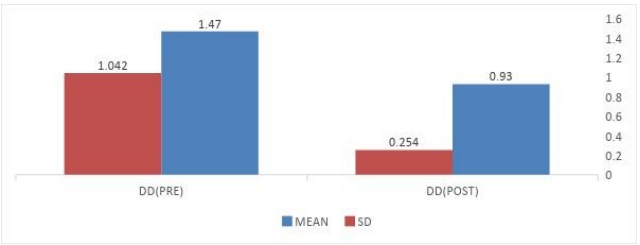
Graph 4: Comparison of pre-post data in the sleep efficiency (SE) component of mean and SD.



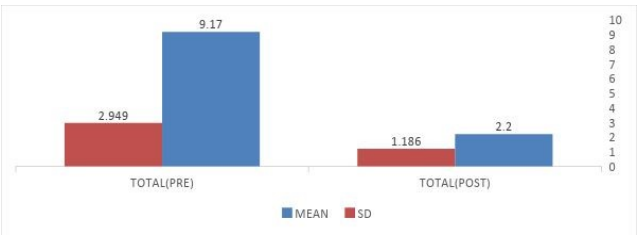
Graph 5: Comparison of pre-post data in the step disturbance (SD) component of mean and SD.



Graph 6: Comparison of pre-post data in the sleep medication (SM) component of mean and SD.



Graph 7: Comparison of pre-post data in the daytime dysfunction (DD) component of mean and SD.



Graph 8: Comparison of pre-post data in the total global score of the PSQI of mean and SD.

Discussion

The results showed efficacy of 15 days YI for significant reduction in the insomnia, sleeping disorder of the participants in case of both males and females' students respectively. The reduction in the post data has been found more significant $p \leq 0.001$. Further comparison of means and standard deviation between the 7 components of the questionnaire and the global score shows significant improvement in the sleep habits. The PSQI assess the sleep quality and quantity [28]. This study shows significant improvement in the 7 factor and the global sleep quality scale scores after YI. The seven components are-subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. All the seven components have dependence on each other resulting in measuring the sleep hygiene.

A Global Sleep Quality score greater than 5 discriminated between good and poor sleepers and yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% [29,30]. Sleep disturbances influences the physical and mental well-being as well as quality of life seriously throughout. Sleep deprivation cause physical as well as emotional consequences such as fatigability, pain intolerance, and decreased immune functioning, irritability, depression, decreased pleasure in work and social activities [31]. The negative effect of sleep difficulties is seen and documented well in the research studies [32]. With increasing irregularity in the bedtime schedule significantly associate with a decrease in average sleep time per day-it is the prevalent problem in young adults to have irregular bedtime schedule affecting the sleep quality factor [33]. As in this study the YI helped in improving the 7 factors of the sleep.

Impacts of proposed YI comprised of 4 types of yoga practices namely (1) postures (2) breath regulation (3) concentration and meditation and (4) dietary therapy. The regular yoga practice helps in promoting the health of an individual leading to inhibit the insomnia factors explained in this study. According to NCCAM, the strategies of health promoting protocol in the mind-body medicine includes relaxation practices, yoga practices etc. as per NCCAM, 2005 [34]. The Previous studies have shown that disturbances of the circadian rhythm produce alterations in sleep architecture and sleep quality known to be associated with fatigue, vigilance problems, decreased productivity, and negative health effects [35,36]. In the article on "Yoga for Insomnia" Kuwajima mentioned that the yoga nidra is the most effective practice of the yogic protocol for the participants suffering from insomnia and on both mental and emotional level which is applied in the treatment of various diseases, including chronic diseases, psychological disorders and so on. It helps in bringing the good sleeping habits inhibiting the cause of insomnia [37]. An increase in bedtime schedule irregularity which is a prevalent problem in young adults to be significantly associated with a decrease in average sleep time per day and it detrimentally affects the sleep quality by disturbance in the circadian rhythm [33]. While the paschimottanasana cultivates openness and positiveness, calm and relaxation to the mind benefiting the sleep problems and disturbances procuring sleep problems and psychological (cognitive and emotional) status can be affected greatly by breathing control regulations like alternate nostril breathing (Nadi shodhana) exercises, brahmari pranayama, the aforesaid breath regulations can inhibit the activated voluntary action of respiration [38].

The consequences of an irregular bedtime schedule may be less significant than those of sleep insufficiency after the adverse effects of an irregular bedtime schedule on sleep should not be overlooked and it postulate that an irregular bedtime schedule affects sleep quality by disturbing the circadian rhythm [35]. Many studies found that if sleep deprivation prolongs for long interval it leads to impairment of cognition, vigilance, and memory, and disturbances of the mood [36,39-41]. Apart from these previous studies, they have determined they directly or indirectly have found the effect of YI on the insomnia cases [13]. Suggestions are made for the students to be encouraged to maintain their sleep quality, and to increase the total sleep time by adding soothing activities like listening to music. The physiological postures increase the control of the voluntary actions and stop the release of stress hormones in the body [42]. The significant improvement in the insomnia cases might be due to the regular practice of yoga including the efficiency to increase the positive change in the sleep habits of the individual leading to the good sleep [17]. The concentration and meditation work on re-examine the pattern of thought, increase the self-awareness and the neurotic patterns and habits. Further research work on insomnia and yoga the physiological effects of yoga poses on psychological conditions has the positive outcome [43]. Such change help to increase the sleep quality and daytime functioning of the students as seen in this study Fifty-nine percent of adults 18 to 29 years of age describe themselves as night owls [44]. Some individual tries to deal with sleep deprivation by making an attempt to increase the practice of sleep in weekends which worsens the problem [45]. The prevalent sleep problem which results in insomnia includes sleep deprivation and resulting in daytime sleepiness contributing to biological and social factors [46].

Further YI enhances the functioning of musculoskeletal, cardiopulmonary, autonomic nervous (ANS) and endocrine system of the body leading the improvement in mood and coping with social circumstances [47,48]. The insomnia and other sleep disorders happens due to the co-occurring sleep and mood problems [49]. Factors like sleep quality, habitual sleep time and current psychopathology effects the sleep time estimation-whereas the sleep quality influences the relation between the subjective and objective indices of sleep [50]. Consequences of lack of sleep leads to mental hyperarousal state whereas conditioned insomnia is due to habitual bedtime irregularity in sleep and sleeping environments [51]. Patients experiencing sleep medication aftereffects have significant daytime dysfunction that includes impairment in work, home and social activities [52]. The Memory of a person also gets affected [53-55]. The Yoga exercises includes stretching and relaxing of muscles significant physical and mental exertion resulting in less sleep latency, more deep sleep, less sleep disturbances, and better sleep efficiency [56-59]. The asanas like savasana helps in balancing the circulatory, digestive, reproductive, immune, nervous & endocrine system and helps in removing the stress & psychological disturbances [60]. The vibration of the sound brings calmness of mind, the cells of the body would be harmonized as each cell is made up of electrons-vibration-provides healing and balancing effects and effective for stabilizing the pranic energy and emotions while meditation and concentration practices helps harmonize our perceptions, thinking, emotions and behavioral patterns and diet is also essential for the body as it bring impact to the body as well as mind [61].

Conclusion

The 15-day YI significantly improved psychosomatic health of its practitioners by reducing their insomnia disorders cases and implied that yoga may be an inexpensive and effective complementary yoga approach for boasting mental health and maximizing the efficiency of

students. The emotional and mental health predicted somatic health by implying mental and emotional wellness as an antecedent for the somatic wellness.

Limitations and Recommendations

Best effort was done to find the standard result, though it was not free from limitation.

Some of them are mentioned below.

- Being a single group pre-post data, it is difficult to compare the level or stage of insomnia cases in students.
- Sample size was too small.
- The measurement of insomnia was made by psychometric tool and was not quantified by the biological markers.
- The duration of YI was short (15 days).

The further study is warranted in considering aforesaid limitations. Some other asanas and meditation may also be included in the intervention session for better result. Timing and the duration of the YI should be more.

References

1. Goldberg LR (1993) The structure of phenotypic personality traits. American psychologist 48: 26.
2. Emert SE, Tutek J, Lichstein KL (2017) Associations between sleep disturbances, personality, and trait emotional intelligence. Personality and Individual Differences 107: 195-200.
3. Wood AM, Joseph S, Lloyd J, Atkins S (2009) Gratitude influences sleep through the mechanism of pre-sleep cognitions. J Psychosom Res 66: 43-48.
4. Mullins-Sweatt SN, Widiger TA (2006) The five-factor model of personality disorder. Personality and psychopathology Chapter 3: 39-70.
5. Toegel G, Barsoux JL (2012) How to become a better leader. MIT Sloan Manag Rev 53: 51-60.
6. Friedman HS, Schustack MW (1999) Personality: Classic theories and modern research. Boston, MA: Allyn and Bacon.
7. Dwan T, Ownsworth T (2019) The Big Five personality factors and psychological well-being following stroke: A systematic review. J Disabil Rehabil 41: 1119-1130.
8. Graham RE, Ahn AC, Davis RB, O'Connor BB, Eisenberg DM, et al. (2005) Use of complementary and alternative medical therapies among racial and ethnic minority adults: Results from the 2002 National Health Interview Survey. J Natl Med Assoc 97: 535.
9. Barnes PM, Powell-Griner E, McFann K, Nahin RL (2004) Complementary and alternative medicine use among adults: United States, 2002. InSeminars in integrative medicine 2: 54-71.
10. Sharma PK, Shukla G, Gupta A, Goyal V, Srivastava A, et al. (2013) Primary sleep disorders seen at a Neurology service-based sleep clinic in India: Patterns over an 8-year period. Ann Indian Acad Neurol 16: 146.
11. Jeter PE, Slutsky J, Singh N, Khalsa SB (2015) Yoga as a therapeutic intervention: A bibliometric analysis of published research studies from 1967 to 2013. J Complement Altern Med 21: 586-592.
12. Pearson NJ, Johnson LL, Nahin RL (2006) Insomnia, trouble sleeping, and complementary and alternative medicine: analysis of the 2002 national health interview survey data. Arch Intern Med 166: 1775-1782.
13. Woolfolk RL, Carr-Kaffashan L, McNulty TF, Lehrer PM (1976) Meditation training as a treatment for insomnia. Behavior Therapy 7: 359-365.
14. Ong JC, Manber R, Segal Z, Xia Y, Shapiro S, et al. (2014) A randomized controlled trial of mindfulness meditation for chronic insomnia. Sleep 37: 1553-1563.
15. Miskiman DE (1977) The treatment of insomnia by the Transcendental Meditation program. Scientific research on the transcendental meditation program: collected papers: 1.
16. Grimmett C, Bridgewater J, Steptoe A, Wardle J (2011) Lifestyle and quality of life in colorectal cancer survivors. Quality of Life Research 20: 1237-1245.
17. Murtagh DR, Greenwood KM (1995) Identifying effective psychological treatments for insomnia: A meta-analysis. J Consult Clin Psychol 63:79.
18. American Academy of Sleep Medicine (2005) International classification of sleep disorders: Diagnostic and coding manual pp. 51-55.
19. Thorpy M (2017) International classification of sleep disorders. InSleep disorders medicine 475-484.
20. Sleep medicine reviews (2011) "What causes insomnia?" NHLBI 25: 52-73.
21. Evidence-Based Complementary and Alternative Medicine (2012) Reports & Drug Effectiveness Review Project.
22. Kertesz RS, Cote KA (2011) Event-related potentials during the transition to sleep for individuals with sleep-onset insomnia. Behavioural sleep medicine 9: 68-85.
23. Doghramji K, Doghramji PP (2007) Clinical management of insomnia: Professional Communications.
24. Morin CM, Espie CA (2007) Insomnia: A clinical guide to assessment and treatment. Springer Science & Business Media p. 1.
25. Mollayeva T, Thurairajah P, Burton K, Mollayeva S, Shapiro CM, et al. (2016) The Pittsburgh sleep quality index as a screening tool for sleep dysfunction in clinical and non-clinical samples: a systematic review and meta-analysis. Sleep Med Rev 25: 52-73.
26. Janssen KC, Phillipson S, O'Connor J, Johns MW (2017) Validation of the Epworth Sleepiness Scale for children and adolescents using Rasch analysis. Sleep med 33: 30-35.
27. Büssing A, Michalsen A, Khalsa SB, Telles S, Sherman KJ (2012) Effects of yoga on mental and physical health: A short summary of reviews. Evid Based Complement Alternat Med 2012: 7.
28. Beck SL, Schwartz AL, Towsley G, Dudley W, Barsevick A (2004) Psychometric evaluation of the Pittsburgh Sleep Quality Index in cancer patients. J Pain Symptom Manage 27: 140-148.
29. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ (1989) The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Res 28: 193-213.
30. Buysse DJ, Reynolds III CF, Monk TH, Hoch CC, Yeager AL, et al. (1991) Quantification of subjective sleep quality in healthy elderly men and women using the Pittsburgh Sleep Quality Index (PSQI). Sleep 14: 331-338.
31. Sheey LC (1996) Sleep disturbances in hospitalized patients with cancer. Oncol Nurs For 23: 109-111.
32. Buboltz Jr WC, Brown F, Soper B (2001) Sleep habits and patterns of college students: A preliminary study. J Am Coll Health 50: 131-135.
33. Borb AA, Achermann P (1999) Sleep homeostasis and models of sleep regulation. J Biol Rhythms 14: 559-570.
34. Bhandari RB (2017) Yogic intervention for coping with distress. J Clin Diagn Res 11.
35. Van OR, Mennuni G (2002) Fatigue and sleep: The point of view of the chronobiologist. Rev Med Brux 23: 288-293.
36. Carskadon MA (2004) Sleep deprivation: Health consequences and societal impact. Med Clin N Am 88: 767-776.
37. Nagarathna R, Nagendra HR (2010) Yoga for promotion of positive health. Swami Vivekananda Yoga Prakashana.
38. Rangan R, Nagendra HR, Bhat GR (2009) Effect of yogic education system and modern education system on memory. Int J Yoga 2: 55.
39. Dement WC (2005) Sleep extension: Getting as much extra sleep as possible. Clin Sports Med 24: 251-268.
40. Dinges DF, Pack F, Williams K, Gillen KA, Powell JW, et al. (1997) Cumulative sleepiness, mood disturbance, and psychomotor vigilance performance decrements during a week of sleep restricted to 4–5 hours per night. Sleep 20: 267-277.

41. Horne JA (1985) Sleep function, with particular reference to sleep deprivation. Ann Clin Res 17: 199.
42. Birdee GS, Yeh GY, Wayne PM, Phillips RS, Davis RB, et al. (2009) Clinical applications of yoga for the pediatric population: A systematic review. Acad Pediatr 9: 212-220.
43. Field T (2011) Yoga clinical research review. Complementary therapies in clinical practice 17: 1-8.
44. Mongelia P (2007) The National Sleep Foundation. J Consum Health Internet 11: 85-90.
45. Wolfson AR, Carskadon MA (2003) Understanding adolescent's sleep patterns and school performance: a critical appraisal. Sleep Med Rev 7: 491-506.
46. Gaultney JF (2010) The prevalence of sleep disorders in college students: impact on academic performance. J Am Coll Health 59: 91-97.
47. Chanavirut R, Khaidjapho K, Jaree P, Pongnaratorn P (2006) Yoga exercise increases chest wall expansion and lung volumes in young healthy Thais. Thai J Physiol Sci 19: 1-7.
48. Ross A, Thomas S (2010) The health benefits of yoga and exercise: a review of comparison studies. J Altern Complement Med 16: 3-12.
49. Liu X (2004) Sleep and adolescent suicidal behavior. Sleep 27: 1351-1358.
50. Vanable PA, Aikens JE, Tadimeti L, Caruana-Montaldo B, Mendelson WB (2000) Sleep latency and duration estimates among sleep disorder patients: variability as a function of sleep disorder diagnosis, sleep history and psychological characteristics. Sleep 23: 1.
51. Lim LL, Foldvary-Schaefer N (2008) Sleep disorders.
52. Fitzgerald T, Vietri J (2015) Residual effects of sleep medications are commonly reported and associated with impaired patient-reported outcomes among insomnia patients in the United States. Sleep dis 2015.
53. Poceta JS (2011) Zolpidem ingestion, automatisms, and sleep driving: a clinical and legal case series. J Clin Sleep Med 7: 632-638.
54. Roth AJ, McCall WV, Liguori A (2011) Cognitive, psychomotor and polysomnographic effects of trazodone in primary insomniacs. J sleep res 20: 552-558.
55. Tsai MJ, Tsai YH, Huang YB (2007) Compulsive activity and anterograde amnesia after zolpidem use. Clinical Toxicology 45: 179-181.
56. Chen KM, Chen MH, Chao HC, Hung HM, Lin HS, et al. (2009) Sleep quality, depression state, and health status of older adults after silver yoga exercises: cluster randomized trial. Int J Nurs Stud 46: 154-163.
57. Chen KM, Chen MH, Lin MH, Fan JT, Lin HS, et al. (2010) Effects of yoga on sleep quality and depression in elders in assisted living facilities. J Nurs Res 18: 53-61.
58. Cohen L, Warneke C, Fouladi RT, Rodriguez MA, Chaoul-Reich A (2004) Psychological adjustment and sleep quality in a randomized trial of the effects of a Tibetan yoga intervention in patients with lymphoma. Cancer: Interdisciplinary Int J American Cancer Society 100: 2253-2260.
59. Pilcher JJ, Ginter DR, Sadowsky B (1997) Sleep quality versus sleep quantity: relationships between sleep and measures of health, well-being and sleepiness in college students. J Psychosom Res 42: 583-596.
60. Kuwajima A (2010) Yoga for insomnia. Yoga point.
61. Rani K, Tiwari SC, Singh U, Agrawal GG, Ghildiyal A, et al. (2011) Impact of Yoga Nidra on psychological general wellbeing in patients with menstrual irregularities: A randomized controlled trial. Int J Yoga 4: 20.