

Original Research Article

Yin yoga improves sleep quality more than Vinyasa yoga on female office workers with mild to moderate insomnia during the COVID-19 pandemic

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ABSTRACT

Background: The COVID-19 pandemic triggers anxiety in individuals due to uncertain changes. Female workers experience greater stressors because of the demands related to work and family; thus, they are prone to chronic sleep disorders, insomnia, and other conditions. Yoga, as an alternative to medical therapy, can reduce the hyperarousal state caused by autonomic imbalance and improve sleep quality. The objective of this study was to measure the effectiveness of Yin and Vinyasa yoga in enhancing sleep quality in female office workers suffering from mild to moderate insomnia.

Methods: This experimental study employed a before and after test control group design. Respondents were 30 female office workers in Malang and Bali with sleep disorders measured by the insomnia severity index (ISI), which were divided into two groups of 15. The PSQI measurement was performed to determine changes in sleep quality post-intervention.

Results: Wilcoxon test assessed the hypothesis, and all components have $p < 0.05$, which indicates a significant difference between pre and post-Vinyasa yoga intervention and similar results for the Yin yoga with paired t test. To test the comparison of the mean sleep quality using the Mann Whitney U test, the value of $p = 0.019$ ($p < 0.05$) showed a significant difference post-intervention. Descriptive statistics show the improvement in the Vinyasa Yoga and Yin yoga groups was by 60% and 86.7, respectively.

Conclusions: From the results, the conclusion is that Yin yoga improves sleep quality better than Vinyasa yoga for female office workers during the COVID-19 pandemic.

Keywords: Vinyasa yoga, Yin yoga, Insomnia, Sleep quality

INTRODUCTION

The COVID-19 pandemic has brought monumental changes in human lifestyles. Humans are required to adapt and keep pace with the rapid spread and mutation of viruses. Restrictions on social activities, resulting in inequality that brings its own physical and psychological impacts. Various new health protocols and social distancing restrictions limit human social interactions and daily sun exposure, which has the potential to disrupt

daily sleep rhythms.¹ This is in line with the statement that the amount of time to sleep during work from home is not commensurate with the quality of sleep. A person tends to spend too much time at home sleeping, followed by unhealthy eating habits, so that sleep quality declines.²

Poor sleep quality is caused by stress or major changes that affect the quality of life, indirectly a manifestation of the fight or flight response to threats.³ Sleep disturbances in the form of insomnia were the most common during

the pandemic in female workers population.⁴ In a survey in Asia Pacific in 13 countries, including Indonesia, there have been 70% of respondents who have had sleep disorders.⁵ This is reinforced by the statement that the patient's visit to a psychiatrist has shifted. During the start of the pandemic the trend showed high anxiety, starting in June 2020, switching to a sleep disorder trend was twice as much as before the pandemic.⁶

Insomnia therapy includes pharmacological and non-pharmacological. Lately, non-pharmacological approach as self-help media is increasingly being promoted, starting by increasing sun exposure in the morning, reducing social media activities and negative news, improving sleep hygiene, reducing screen time, and mild physical activities that are relaxing such as yoga.⁷ This statement is evidenced by research, which states that a regular yoga program can reduce anxiety and improve sleep disturbances within a minimum of 10 days, and optimal effects can be felt starting eight weeks from a consistent session.⁸ Yoga can have a relaxing effect and is one of the suggested strategies to improve sleep quality.⁷

As development progressed, there was a simplification of classical yoga into modern yoga with the virtues of asanas, pranayama, and meditation.⁹ In modern-day, various variations of well-known yoga emerge, one of which is Yin yoga, a type of static yoga where the emphasis is on long, deep, focused stretches. In contrast to Vinyasa yoga which is more dynamic and emphasizes deep breathing and stimulating cardiovascular activity.¹⁰ Until now, research is still limited to the effects of yoga in general, and there are no studies that compare the effectiveness of static and dynamic yoga on sleep quality. Based on this background, the researcher wanted to explore the effect of yin yoga, in contrast with gentle flow vinyasa yoga, to enhance sleep quality in female office workers suffering from mild to moderate insomnia due to the COVID-19 pandemic.

METHODS

Population and sample

This research was conducted by randomized pre and post-test control group design. The sample consisted of 30 respondents, which were divided into two intervention groups of 15 respondents. The target population was female office workers of productive age with sleep disorders. The accessible population in this study were 30 female office workers of productive age in Malang and Bali with sleep disorders who voluntarily registered to participate in online yoga sessions from Bengkel riverside studio Malang either in person or through social media during the registration period October-November 2021.

The inclusion criteria in this study were female workers aged between 18-40 years who experienced insomnia

sleep disorders before the study (proven by Insomnia Severity Index (ISI) scores > seven and <22). Subjects with COVID-19 positive, people with disabilities with limitations in their limbs, who are under the influence of drugs that cause sleep disturbances and are undergoing therapy for sleep disorders, were excluded from this study. Analysis of the data in the Vinyasa group found that the distribution was not normal, so the Wilcoxon match pair test was used. While the data is normally distributed in the Yin group, so the paired samples t test was used. For the difference test in the unpaired group, the data distribution was not normal, so the Mann-Whitney U-test was used to test the significance between the two groups.

ISI

The ISI consists of a 7-item self-report questionnaire that assesses the causes, severity, and effects of insomnia in individuals based on complaints experienced in the last 14 days. The instrument consists of several languages and a 5-point Likert scale. It was divided into four categories, namely non-clinical insomnia (score 0-7), below the threshold insomnia (score 8-14), moderate clinical insomnia (score 15-21), and serious clinical insomnia (score 22-28). The results will be interpreted as whether a person requires medical therapy or not for his insomnia condition.¹¹ The questionnaire is available in Indonesian (ISI-INA), which has been tested for validity and reliability. ISI-INA has a value of $r=0.997$ and Cronbach alpha 1 and 2= 0.989 and 0.929 .¹²

Pittsburgh sleep quality index (PSQI)

The PSQI is designed to evaluate overall sleep quality. The survey analyzed subjective sleep quality, sleep duration, sleep latency, sleep habits, presence or absence of sleep disturbances, drug use, and morning dysfunction in the past month prior to assessment. Each question component will be converted based on a score of 0-3 and then added up as a whole. The lower score obtained indicates minimal sleep disturbance and better sleep quality.¹³ Improvements in sleep quality can be seen from improvements in each component and, in general, through improvements in global scores. The PSQI is available in the Indonesian version (PSQI-I), which has been tested for validity and reliability. PSQI-I has a value of $r=0.36-0.56$, with Cronbach's alpha values for each item ranging from 0.69 to 0.72.¹⁴

Yin yoga

Yin yoga is a type of static yoga with an emphasis on focused deep, long stretches. In this study, it was conducted two times a week for eight weeks in the afternoon with live zoom. Each session combines asana and pranayama in a 60-minute time contract in addition to the Yin pranayama session. The asana combination consists of resting belly pose, cat and cow, downward dog, half sun salutation, toe squat, squat, half-butterfly,

half-butterfly backbend, reclining twist, legs up, and corpse pose.^{10,15}

Vinyasa yoga

Vinyasa yoga is a type of dynamic yoga that has the character of continuous pose/flow, a movement that is always initiated by breath (Ujjayi), cardiovascular activation, sequence variation, and movement meditation. In this study, the Vinyasa slow flow or gentle Vinyasa is used. The intervention was carried out two times a week for eight weeks in the morning with live Zoom. Each session has a 60-minute contract time apart from the Ujjayi pranayama session. The asana combination consists of lateral neck stretch, downward dog, sun salutation, saddle pose, half-frog, caterpillar pose, reclining pigeon, supported bridge, reclining twist, and corpse pose.¹⁶

RESULTS

In accordance with the limitation of research design, all 30 respondents are women. Of the 30 samples, randomly divided into two intervention groups. The demographic of the respondents in groups 1 and 2 seen in Table 1.

Hypothesis test used in group 1 is Wilcoxon test because the data are not normally distributed. It shows the different test results for each component of the PSQI and global score. All results show $p < 0.05$. We can summarize that there is a significant difference between before and

after Vinyasa yoga intervention because it has a $p < 0.05$.

Table 3 shows the results of different sleep quality tests in group 2 before and after the Yin yoga intervention. All of the results had a $p < 0.05$, which indicates clear differences in sleep quality pre and post the Yin yoga intervention. The mean difference was significant before and after the intervention because it had a $p < 0.05$.

To examine the comparison of the mean sleep quality in group 1 and group 2, a statistical test was performed using the Mann Whitney U test, the results of which can be seen in Table 3.

Based on Table 4, the results of the mean difference test for each PSQI component have a $p < 0.05$, which indicates there is a significant difference after being given an intervention between group 1 and group 2. 0.05, thus there is a significant difference after the intervention between group 1 and group 2. For the results of the percentage improvement in the pre-post intervention can be seen in Table 5.

There was a difference after the intervention in the two groups based on the global PSQI score. In group 1 there was an improvement of 60% and in group 2 of 86.7%. It can be concluded that from the Mann-Whitney test and the percentage of global PSQI scores support the third hypothesis, namely Yin yoga is more effective than Vinyasa yoga in improving sleep quality in female office workers with mild to moderate insomnia.

Table 1: Respondent demographic.

Groups	Age (Years), mean \pm SD	Domicile		Work setting		Marital status	
		Malang	Bali	Office	Home	Single	Divorce
Group 1	27.267 \pm 3.973	7	8	6	9	14	1
Group 2	27.800 \pm 3.858	6	9	8	7	14	1

Table 2: Wilcoxon test for group 1 with Vinyasa intervention.

Variables	Pre-intervention, (Mean \pm SD)	Post-intervention, (Mean \pm SD)	P value
Sleep quality	1.200 \pm 0.676	0.670 \pm 0.724	0.033
Sleep duration	1.870 \pm 0.990	1.334 \pm 0.976	0.023
Sleep latency	1.334 \pm 0.724	0.870 \pm 0.743	0.020
Sleep efficiency	0.870 \pm 1.187	0.070 \pm 0.258	0.024
Sleep disturbance	1.070 \pm 0.258	0.400 \pm 0.507	0.002
Medication use	0.730 \pm 0.458	0.270 \pm 0.458	0.020
Day-time dysfunction	1.334 \pm 0.617	0.730 \pm 0.594	0.007
Global score	8.400 \pm 1.639	4.334 \pm 1.589	0.001

Table 3: Paired sample t test for group 2 with Yin intervention.

Variables	Pre-intervention, (Mean \pm SD)	Post-intervention, (Mean \pm SD)	P value
Sleep quality	1.270 \pm 0.799	0.130 \pm 0.352	0.002
Sleep duration	2.667 \pm 0.488	2.130 \pm 0.640	0.023
Sleep latency	1.470 \pm 0.990	0.334 \pm 0.488	0.003
Sleep efficiency	0.800 \pm 0.862	0.400 \pm 0.507	0.034
Sleep disturbance	1.070 \pm 0.258	0.070 \pm 0.258	0.000
Medication use	0.334 \pm 0.488	0.000 \pm 0.000	0.025
Day-time dysfunction	1.470 \pm 0.640	0.200 \pm 0.414	0.001
Global score	9.070 \pm 2.915	3.270 \pm 1.534	0.001

Table 4: Mann Whitney U test in group 1 and group 2.

Variables	Group 1, (Mean ± SD)	Group 2, (Mean ± SD)	P value
Sleep quality	0.670±0.724	0.134±0.352	0.019
Sleep duration	1.334±0.976	2.134±0.640	0.017
Sleep latency	0.870±0.743	0.334±0.488	0.038
Sleep efficiency	0.070±0.258	0.400±0.507	0.034
Sleep disturbance	0.400±0.507	0.700±0.258	0.034
Medication use	0.270±0.458	0.000±0.000	0.035
Day-time dysfunction	0.730±0.594	0.200±0.414	0.010
Global score	4.334±1.589	3.270±1.534	0.043

Table 5: Descriptive statistics before-after percentage PSQI global score.

Groups	Pre test (%)		Post test (%)	
	Good	Bad	Good	Bad
Group 1	0	100	60	40
Group 2	0	100	86.7	13.3

DISCUSSION

Respondent background difference

The inclusion criteria were set based on the reason that the female population of productive young age and actively working is more susceptible to sudden changes, emotional responses, greater sadness and anxiety when compared to older age.¹⁷ The sample in this study is domiciled in Malang and Bali. Because the intervention was carried out in each other's homes, there was no need for acclimatization to adjust to differences in altitude or temperature when the intervention was carried out. This is in line with the research, which reported no drastic difference related to location and temperature during yoga intervention with room temperature when cellular and cardiovascular adaptation had occurred in individuals who stayed for a long time.¹⁸ However, what has the potential to be a differentiator in the respondent's characteristics is the different cultures of the Javanese and Balinese in responding to stressors.

According to Hofstede's concept, the characteristics of the Javanese are concluded as a collective tribe, having a high power distance, prone to avoiding uncertainty, masculine-feminine balance, and short-term orientation. At the same time, characteristics of the Balinese are collective, have a high power distance, are more tolerant of uncertainty, are feminine, and are short-term oriented. The collective quality of the two tribes shows the similarity of orientation toward the family is quite large, so it will be very influential if there are stressors that can

harm the family. The difference between the Javanese and the Balinese is that the Javanese are prone to avoiding uncertainty while the Balinese tend to be more tolerant. This affects how to deal with and manage stress due to uncertain conditions; for this, the Balinese are superior. The next difference is gender roles related to pressure and workload. The Javanese have equal masculine and feminine gender roles so that men and women can carry out similar duties and responsibilities in the family. Meanwhile, the Balinese are more about feminine gender roles, so women get extra demands in taking care of everything at the same time.¹⁹

Although in this study, all samples were single or divorced without children, it didn't mean that they were exposed to less stress. The demands of professionalism that do not stop during the pandemic, plus the anxiety of transmitting the disease to the closest people, should be taken into account. This condition is inevitable given the nature of women to be more family-oriented and supportive milestones of a family. This is no exception for women who are not married but live with their closest family.²⁰ These changes have adverse consequences on the sleep of many women who lack support from the closest and the environment, especially the nuclear family. Working women often fall into chronic sleep disorders, even leading to other comorbid conditions without realizing it.²¹ Unmarried female workers should also take into account their position as the backbone in terms of the financial and functional aspects of a family, especially when their parents are retired.²⁰

In women, the problem of subpar sleep quality has a pervasiveness of 47%, especially if they sleep for fewer than six hours per night. When sleep complaints are associated with other comorbidities, the end results become more critical and may boost the gravity of sleep issues in women. In female office workers, workload and work environment can be a stressor and trigger depression. This is associated with a boost in the rate of complaints of poor sleep quality four-fold compared to women who are not in the labor force.²² Sleep disturbances and changes in sleep quality in women are related to the presence of estrogenic receptors in brain areas linked with sleep regulation.²¹ These receptors translate the level of estrogen in a woman's body, which is positively correlated with better sleep quality than at higher levels of progesterone. Unfortunately, the younger the age group, the more susceptible to fluctuations in sleep quality that can interfere with estrogenic receptor function. Fluctuations are primarily due to changes in working hours, stress levels, and irregular sleep-wake patterns.²³ As a result, estrogen levels translate into a low state. As many as 20% of younger women report excessive sleepiness, fatigue, or both, compared to middle-aged and elderly women.²¹ Although hormonal oscillation is a physiological condition, disturbances in these receptors increase pain and increase vasomotor symptoms that can disrupt sleep and cause sleep deprivation.²⁴

Yin yoga effectivity in improving sleep quality in female office worker population

Yin yoga promotes optimal relaxation in restrained movements and slow execution. Its emphasis on long, deep, focused stretches can reduce the sympathetic response and increase the parasympathetic response, thereby lowering heart rate and stress hormones (cortisol and adrenaline), on the other hand increasing serotonin and dopamine, thereby the fight or flight response of the sympathetic nerves decreases.¹⁰ This decrease is also due to the high control of the cardiac vagal response during parasympathetic switching, which results in subjective and objective improvements in sleep quality.²⁵ The pattern of breathing and movement that focuses on stretching the spine and lower body is useful for stimulating relaxation, reversing the effects of gravity on the body, and lowering tension to the fascia level so that it can maximize the oxygen that enters the cells and brain. As a result, higher slow-wave sleep (SWS) triggers relaxation and sleep.^{10,26}

The pranayama pattern in Yin yoga increases alpha wave activity and decreases beta activity which contributes to psychological and neurological disorders.²⁶ Deep breathing is useful for focusing the mind on a certain activity that will reduce the daily overload of information received by the cerebral cortex and hypothalamus. In addition, it reduces symptoms of anxiety and improves mental health through down-regulation responses to the hypothalamic pituitary adrenal (HPA) and sympathetic nervous system. Static yoga can inhibit the activity of the hypothalamic pre-ventricular nuclei to reduce the production of adrenocorticotropin hormone (ACTH), thereby stimulating a decrease in the hormone cortisol and the secretion of endorphins and serotonin hormones.²⁷

The resistance and slow movements of Yin yoga program the body into a meditative state which is reflected in external sensorimotor processing. As a result, the alert phase in the frontal and prefrontal parts of the brain decreases so that the limbic system is more difficult to trigger and lower musculoskeletal tone.²⁸ This increase in slow-wave sleep is responsible for improving sleep quality. The mechanism that may affect sleep quality and subjectively there is an improvement is the effect of cognitive restructuring from a combination of consistently meditative movements that make mental processing of external input more relaxed.²⁹

The research also compared patients with mild sleep disorders and female workers who were given a yoga intervention with slow and meditative movements showing significant changes in sleep quality parameters.²⁹ The most visible parameters were sleep latency and satisfaction after waking up. In addition, this intervention led to an improvement in depression and anxiety and increased participants' motivation and satisfaction with their work. Although the mechanism is not yet clear, the

presence of the meditation aspect can generate mindfulness. If this stage is reached, it can have positive benefits on the executive function of attention which regulates mood, anxiety, emotional stability, and psychological symptoms such as sleep disturbances.³⁰

Vinyasa yoga effectivity in improving sleep quality in female office worker population

The characteristics of Vinyasa yoga are continuity of pose, a movement that is always initiated by breath (Ujjayi), cardiovascular activation, sequence variation, and movement meditation.¹⁶ These three characters have the basis that breath is the main door of the body's physiological response, and when triggered by cardiovascular activity, humans will find it difficult to maintain their movements without excessive response.³¹ Vinyasa breath control is always associated with movement, its function is to focus the mind on a single task, thereby increasing concentration on daily executive functions. An active set of asanas serves to target each potential that may have a different effect on each individual to optimize the benefits of breathing, even when it comes to executing complex tasks. Vinyasa generally involves expansive movements that stimulate maximal inspiration with minimal resistance. During Ujjayi pranayama, there is a restriction of the glottis when breathing until it emits a hiss. This effort serves to increase each individual's control of the flow of their respective breaths in active asanas and avoid excessive mouth breathing, which can reduce the supply of free oxygen to the brain.³² The practice of Ujjayi 5-8 counts can control the response of movements, timing, and postures that are executed so that they can achieve calm in motion meditation.³¹

The pranayama pattern involves alternating nostril and abdominal breathing, increasing the average strength of the alpha and beta wave bands in the brain.³³ The combination of pranayama and dynamic asanas in Vinyasa yoga balances the functional activity of the right and left lobes of the brain.²⁶ The sequence of asanas in a Vinyasa session always begins with asanas with small, simple movements. Opening with a sitting posture serves to familiarize the practitioner with balancing movement and breath. Surya Namaskar is the key component in Vinyasa, functioning as a warm-up as well as an active resting position between more complex asanas.³⁴ Progressivity in Vinyasa is useful for distributing energy and breath output evenly in each individual phase of inspiration and expiration so that a more dynamic and stable movement can relieve musculoskeletal tension.³⁵

The dynamic, progressive asana arrangement in Vinyasa has the effect of improving the decision-making process after the habit of rhythmic breathing occurs according to the movement and anti-depressant effect because it targets the emphasis on the activity of the adrenal glands. Both can trigger a more stable adrenaline production and improvement in a person's sleep quality if done

consistently.³⁶ In addition, there is theta wave activity, which naturally increases during repeated executions of repeated sets of asanas and deep breathing Vinyasa.³⁷ Of the overall brain wave activity, Vinyasa can help speed up the onset of night sleep as a result of high attention to executive function when a person carries out daily activities during working hours.²⁹

Yin yoga is more effective than Vinyasa yoga in improving sleep quality in female office workers' population

A yoga sequence created by mindfulness intervention, deep relaxation, asanas, and pranayama can have an effect on brain waves. Alpha waves are associated with increased perception of serenity following meditation, breathing, meditation, and asana-based yoga poses. Beta waves are associated with task performance, and theta waves are associated with repetitive autonomic activities, especially after asana-based yoga practice and breathing, so that an individual can deal with and process stressors better. This is supported by the presence of more slow-wave sleep waves in yoga practitioners so that they reach the REM phase more quickly for its effect on brain neurotransmitters such as GABA, serotonin, dopamine, and melatonin, which contribute to decreased stress and promote better sleep through increased parasympathetic activity. In addition, due to the effect on the cortico-thalamic circuit of the basal ganglia, one can shift maladaptive patterns to better adaptive patterns from both posture and daily habits.³⁸

The resistance and slow movements of Yin yoga program the body into a meditative state which is reflected in external sensorimotor processing. As a result, the alert phase in the frontal and prefrontal parts of the brain decreases so that the limbic system is more difficult to awaken and lower musculoskeletal tone.²⁸ The pattern of breathing and movement that focuses on stretching the spine and lower body is useful for stimulating relaxation, reversing the effects of gravity on the body, and lowering tension to the fascia level so that it can maximize the oxygen that enters the cells and brain. As a result, higher slow-type brain waves trigger relaxation and sleep.^{10,26} The pranayama pattern in Yin yoga increases alpha wave activity and decreases beta activity which contributes to psychological and neurological disorders through down-regulation responses to the hypothalamic pituitary adrenal (HPA) and sympathetic nervous system.²⁶ Inhibition of the activity of the pre-ventricular hypothalamic nuclei reduces the production of adrenocorticotropin hormone (ACTH), thereby stimulating a decrease in the hormone cortisol and stimulating the secretion of endorphins and serotonin hormones.²⁷ The presence of the meditation aspect can generate self-awareness which has positive benefits on the executive function of attention that regulates mood, anxiety, emotional stability, and psychological symptoms such as sleep disorders.³⁰

Meanwhile, Vinyasa yoga is a type of yoga that prioritizes continuity of pose/flow, movement initiated with breath (Ujjayi), cardiovascular activation, sequence variation, and movement meditation.¹⁶ Involvement of expansive movements that stimulate maximal inspiration with minimal resistance. The Ujjayi breathing pattern serves to increase each individual's control of their respective breath flow in active asanas and avoid excessive mouth breathing, which can reduce the supply of free oxygen to the brain and achieve a state of calm through motion meditation.^{31,32} The sequence of asanas in a Vinyasa session always begins with an asana with small, simple movements with Surya Namaskar, which functions as a warm-up as well as an active resting position for asanas.³⁴ The dynamic, progressive asana arrangement in Vinyasa has the effect of improving the decision-making process after a habit develops, which can trigger more stable adrenaline production and improvements in one's sleep quality if done consistently.³⁶ Consistency and repetition can trigger theta wave activity and help accelerate the onset of night sleep as a result of great attention to executive function when carrying out daily activities during work hours.^{29,37}

The advantage of Yin yoga is the use of breathing patterns that allow the body to be in a state of optimal meditation and relaxation. This is evidenced by a decrease in brain wave activity and neurotransmitters that trigger excessive alertness and arousal in the limbic system.²⁸ Emphasis on the meditative aspects of Yin yoga can provide more homogeneous results in a more heterogeneous population.²⁷ In contrast to the Vinyasa yoga intervention, which must stimulate active function through habituation in daily practice and executive meditation before it can trigger an improvement in one's sleep onset. Despite the improvement in outcome after the intervention, the relaxation and sleep quality improvement effects of the Vinyasa intervention were more diverse. This is a result of differences in the speed of a person's body in the process of habituation of sustaining power and balance in the functional activities of the right and left lobes of the brain.²⁶

Limitations

Because the intervention is done online, technical errors often occur. In addition, it is difficult to correct whether the intervention carried out by the research sample is in accordance with the intervention procedure that should have been minimized as much as possible. This causes information bias due to differences in perceptions of the intervention, and recall bias due to differences in sample accuracy in reporting exposure or risk factors that can affect the assessment of the instruments. Also, there is no control over the type of coping mechanism of each individual and the hormonal status before the intervention. Follow-up after the study on the long-term effect of giving both the interventions in each group needed.

CONCLUSIONS

Yin yoga improves sleep quality more than Vinyasa yoga on female office workers with mild to moderate insomnia during the COVID-19 pandemic. The percentage comparison of the effectiveness of Yin yoga and Vinyasa yoga is 86.7% and 60%, respectively.

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