



## Effect of Yoga Practice on Psychological and Physical Health Parameters

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### ABSTRACT

**Aim:** The objective of the study was to analyze the effect of yoga on psychological and physical health parameters of the practitioners, in comparison with before yoga practice.

**Materials and Methods:** A sample of 100 people from Kozhikode District of Kerala State in India with minimum six months of yoga practice, having the same medical problems which were there before yoga practice and taking the same treatment / medicines which were there before doing yoga were selected through random sampling technique. Data was collected from them on-line using a questionnaire containing the characteristics of the respondents and responses to improvements in psychological and physical health parameters due to yoga practice. Scoring was done using the Likert equal interval method. The sum of scores for improvements in psychological and physical health parameters was worked out as the total health score of the respondents. Mann-Whitney u test, Kruskal Wallis test, Odds ratio and Random forest were the statistical techniques used in data analysis.

**Results:** Majority of the yoga practitioners have high to medium level of health. A very high proportion of people have achieved slight and very much improvement in the psychological and physical health parameters due to yoga practice with or without treatment / medicines, when compared to the pre-yoga base line condition of with or without treatment / medicines. Yoga practitioners maintain very less hostility towards others and good level of calmness, which could contribute to their better wellbeing. Age and months of yoga practice have significant contribution to the health of the respondents. People who practice “yoga nidra” are found to have a very high chance of maintaining good health than those who do not practice it

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## INTRODUCTION:

Yoga is a part of the ancient Indian philosophy, which helps to balance the functions of the sympathetic and parasympathetic nervous system, endocrine system and the left and right hemispheres of the brain, contributing to control of the body and mind, enabling us to enjoy life. It works through a combination of physical activity and mental calmness. The benefits of yoga for the mind include the ability to focus our thoughts and get more done, the ability to be more aware of our body, and also a much better understanding of what we are doing physically during the physical activities we do. Yoga has been reported to have benefits for mental and physical health such as reducing stress, anxiety and depression, reducing inflammation, improving the health of heart, reducing chronic pain, improving sleep quality, improving body flexibility, breathing etc. (13 Benefits of Yoga That Are Supported by Science. Healthline. <https://www.healthline.com/nutrition/13-benefits-of-yoga-retrieved> 1<sup>st</sup> October 2020).

A study was carried out by WEDO (an NGO) based at Kozhikode, Kerala, India in collaboration with Satyananda Yoga Research Centre, Kozhikode to analyze the effect of yoga on psychological and physical health parameters of the practitioners.

### Materials and Methods

A sample of 100 people from Kozhikode District of Kerala State in India with minimum six months of yoga practice, having the same medical problems which were there before yoga practice and taking the same treatment / medicines which were there before doing yoga were selected through random sampling technique. Data was collected from them on-line using a questionnaire containing responses to improvements in various psychological and physical health parameters due to yoga, in comparison with before yoga practice (considered as the base line). The

questionnaire also included the characteristics of respondents such as age, sex, months of yoga practice, days per week of practice, whether doing the main relaxation component of “yoga nidra” under yoga and whether they are interested in continuing yoga practice. The psychological parameters include stress, anxiety, depression, calmness, wellbeing, mental balance, relaxation, mood, concentration, memory, attention, self-acceptance, relationship with people, hostility etc., and physical health parameters such as BP, sugar, cholesterol, gas, heart problem, pain in joints/back/neck etc. and other problems, if any.

### Measures

The responses to improvements in the parameters viz; very much, slightly, not at all were scored with the Likert equal interval method. The responses to practicing “yoga nidra” and interest in continuing yoga were collected as yes / no and scored with the Likert method. The figures reported for months and days per week of yoga practice were considered as discrete variables. The sum of scores for improvements in psychological and physical health parameters was worked out as the total health score of the respondents.

### Statistical analysis

Statistical analyses were performed using R studio (Version 1.3.959) and MS excel (windows-10) considering five per cent level of statistical significance. Frequency tables and summary statistics were used to describe the variables under study. Mann-Whitney u test and Kruskal Wallis test were used to assess the significant difference in personal characteristics and various aspects of yoga practice with respect to health. Odds ratio and Random forest technique were used to assess the association of health scores with the characteristics of yoga practitioners.

### Results

Table 1 shows the level of health of the yoga practitioners (considering the psychological and physical health

parameters), namely, Low, Medium and High, which was categorised through the

quartile deviation method based on the total health score.

Table 1. Level of health of the yoga practitioners

Detail	Category	Respondents (%)	Mean score
Level of health*	Low	27	26.67
	Medium	27	41.67
	High	46	69.59

\* Categorised based on the total health score through the quartile deviation method

Table 2 shows the details of yoga practitioners reporting different levels of improvement in the psychological parameters, when compared to the base line condition (without yoga practice, with

or without treatment / medicines), with a very high proportion reporting significant improvement. Similarly, a very high proportion report significant improvement in physical health parameters also due to yoga practice, when compared to the base line condition

(Table 2).

Table 2. Respondents reporting improvement in parameters due to yoga practice compared to the base line condition

Level of improvement in psychological parameters	Respondents (%*)
Very much	47.5
Slightly	27.2
Not at all	25.3
Total	100.0
Level of improvement in physical health parameters	
Very much	45.5
Slightly	41.4
Not at all	13.1
Total	100.0

\*Mean %

The proportion of respondents experiencing very much and slight improvement in various psychological and

physical health parameters through the practice of yoga, when compared to the base line condition is shown in Table 3.

**Table 3. Level of improvement in various parameters due to yoga practice**

Psychological parameters	Respondents (%) reporting improvement		
	Very much	Slight	Not at all
Stress	50.0	25.0	25.0
Anxiety	37.5	50.0	12.5
Depression	33.3	33.3	33.3
Relaxation	50.0	10.0	40.0
Calmness	29.0	29.0	42.0
Memory	37.5	50.0	12.5
Concentration	33.3	50.0	16.7
Attention	62.5	12.5	25.0
Mood	44.4	33.3	22.3
Wellbeing	37.5	25.0	37.5
Mindfulness	62.5	12.5	25.0
Relationship with people	50.0	30.0	20.0
Steadiness in life	50.0	12.5	37.5
Hostility	75.0	12.5	12.5
Hyper activity	80.0	Nil	20.0
<b>Physical health parameters</b>			
BP	50	25	25
Sugar	67	33	Nil
Cholesterol	75	25	Nil
Heart problems	67	Nil	33
Gas	20	80	Nil
Joint pain	28	57	15
Back pain	40	60	Nil
Neck pain	40	40	20
Respiratory problem of Asthma	Nil	100	Nil
Frequent cold	100	Nil	Nil
Reduction in blood count	50	50	Nil

The correlation between the improvement scores of the relationship with people and hostility of the yoga practitioners was found to be 0.64, between hostility and wellbeing was 0.62, between calmness and wellbeing was 0.65, between family problems and wellbeing was 0.93, while the correlation between attention and concentration was 0.73, which were all statistically significant at probability ranging from 0.01 to 0.05

Table 4 shows the Inc Node Purity values of different characteristics of the yoga practitioners worked out using the Random Forest Technique, with the total health score as the response variable. The values indicate the relative importance / contribution of the score of the characteristics to the total health score. Age and Months of yoga practice are the characteristics having high contribution to the total health score.

Table 4. Contribution of the characteristics of yoga practitioners to the total health score

Characteristic	Inc Node Purity value
Age	12881.16
Months of yoga practice	7084.1
Days per week of yoga practice	2462.01
Doing “yoga nidra”(score)	691.22
Interest in continuing yoga (score)	3208.75

Results of the Odds ratio presented in Table 5 indicate the chances of the yoga practitioners to obtain a high health score (indicating a high level of health) under different categories of two characteristics of the practitioners, namely, age and doing “yoga nidra”. Table 5

also shows the health score of the yoga practitioners based on three characteristics, namely, age, period of yoga practice (months) and doing “yoga nidra”, which showed statistically significant difference among various categories of these characteristics.

Table 5. Odds Ratio and test of significance of characteristics with respect to the health score

Characteristic	Category		Odds Ratio*	
Age	Young (<35 years)		0.00	
	Middle (35-55 years)		4.15	
	Old (> 55 years)		3.86	
Doing “yoga nidra”	No		0.03	
	Yes		36	
Characteristic	Category	Mean total health score	test statistic value	Significance
Period of yoga practice (months)	Up to 36	34.6	729**	<i>p</i> <0.01
	36-60	58.9		
Doing “yoga nidra”	Yes	54.62	324**	<i>p</i> <0.01
	No	31.50		
Age	Young	31.67	36.15***	<i>p</i> <0.01
	Middle	52.46		
	Old	62.50		

\* with respect to high health score \*\* through Mann Whitney u test  
\*\*\*throughKruskal -Wallis chi-squared test

## **Discussion**

46 % and 27 % of yoga practitioners have high and medium levels of health respectively, while only 27 % fall in the low health group (Table 1). About 75 % of respondents have experienced slight and very much improvement in the psychological parameters, while 87 % report slight and very much improvement in physical health parameters due to yoga with or without treatment /medicines, when compared to the base line condition of with or without treatment / medicines (Table 2). It can be inferred from Table 3 that yoga practitioners in the range of 58 to 87.5 % have experienced very much and slight improvement (when considered together) in 15 psychological parameters through the practice of yoga, when compared to the base line condition. Similarly, 67 to 100 % of people have reported very much and slight improvement in the physical health parameters through yoga practice, when compared to the base line condition (Table 3).

These results justify the effect of yoga on the health of the practitioners. The Yoga Journal, April 2017 mentions 38 health benefits of yoga (<https://www.yogajournal.com/lifestyle/count-yoga-38-ways-yoga-keeps-fit> retrieved 7<sup>th</sup> October 2020). Most studies on yoga reported a reduction of systolic and / or diastolic pressure. (Innes et al 2005). The AHRQ cites two studies comparing yoga versus medication which reported a large and significant reduction of fasting glucose in individuals with type 2 diabetes in one study, and a smaller but still significant improvement in the other study. (Ospina 2007). After intervention with yoga for a period of 3 months the respondents showed a decrease in total cholesterol, triglycerides and LDL, with an improvement in HDL. (Shantakumari and Sequeira S 2013)

Beyond off-loading stress, practicing yoga may help lower blood pressure, blood cholesterol and blood glucose levels, as well as heart rate, making it a useful lifestyle intervention. One study has shown that blood measurements and waist circumference - a marker for heart disease - improved in middle-aged adults with metabolic syndrome who practiced yoga for three months. Another study has shown that slow-paced yoga classes twice a week reduced the frequency of atrial fibrillation episodes in patients with that condition. In another report, patients with heart failure who went through an eight-week yoga program showed improvement in exercise capacity and quality of life. They also had lower blood levels of markers for inflammation, which contributes to heart disease (The Yoga- Heart Connection. Health.<https://www.hopkinsmedicine.org/health/wellness-and-prevention/the-yoga-heart-connection#:~:text=Yoga%20as%20Heart%20Booster,it%20a%20useful%20lifestyle%20intervention> - retrieved 5 October 2020)

Based on the analysis of 70 studies that met specific inclusion criteria between 1970 and 2004, which were with the role of yoga and the reduction of insulin resistance, metabolic syndrome and cardiovascular diseases, one mechanism of yoga hypothesized to improve the cardiovascular risk profile is that the physical postures or breathing exercises exert a massaging effect that stimulates the vagal nerve (Innes et al 2005).

The underlying physiology by which the practice of yoga therapy can improve cardiovascular disease-related outcomes may involve parasympathetic activation and extracellular factor release stimulation. Yoga effects could stem from three mechanisms: vagal nerve stimulation, reduction in perceived stress, and musculoskeletal stimulation. By massaging the vagal nerve directly, yoga may promote parasympathetic activation

thus leading to decreased HR, blood pressure, improved HR variability (HRV), and similar metabolic and psychological benefits resulting in an improved outcome (Pullen et al 2018) There was statistically significant reduction in day and night asthma attacks in the yoga group. The yoga group showed 66.7% reduction in the use of salbutamole puff and 58.3% salbutamole tablets. There was a 10% increment in the PEFr in the yoga group while only 2% in the control group. (Mekonnen D and Andualem M 2010). All the reviewed studies on yoga for the treatment of back pain (6 studies) reported positive effects in favour of the yoga interventions (Bussing et al 2012). In individuals with pain, yoga may have beneficial effects with overall moderate effects sizes. The beneficial effects might be explained by an increased physical flexibility, by calming and focusing the mind to develop greater awareness and diminish anxiety, reduction of distress, improvement of mood, and so forth (Bussing et al 2012).

Under the study reported in this paper, the maximum possible score for hostility indicates the lowest level of hostility, while the maximum score for calmness and wellbeing denote the highest level of these parameters. The mean hostility score of the respondents in the study was found to be equal to about 87 % of its maximum score, while the mean score for calmness was about 63 % of the maximum score of the parameter. This implies that the yoga practitioners have very less hostility towards others and maintain good level of calmness. This could have contributed to the statistically significant high correlation which was observed between these two psychological parameters and wellbeing (which also showed a high mean score of about 67 % of its maximum possible score). This implies that yoga has been able to inculcate the positive emotions of less hostility and more calmness, which could contribute to better wellbeing for them. Chavez et al (2019) report that

negative emotional responses are associated with higher perceived stress, lower subjective health and lower subjective wellbeing. Conversely, positive emotional responses are associated with lower perceived stress, higher subjective health, and higher subjective wellbeing. Yoga can damp one's hostility with a layer of calmness (Angela Haupt 2020). Randomised Control Trials found beneficial effects of yoga on mental health (Uebelacker et al 2010).

Age and months of yoga practice are the characteristics having high Inc Node Purity values, indicating their significant contribution to the total health score (Table 4). It can be made out from Table 5 that that the middle age (odds ratio of 4.15) and old age (odds ratio of 3.86) yoga practitioners have about four times more chances of obtaining a high health score than young practitioners. The health score of people with up to 36 months of yoga practice is only 34.6, while that of people with 36 to 60 months of practice it is 58.9, indicating better health for this category (Table 5). It can also be inferred from Table 5 that people who practice "yoga nidra" have a very high chance of obtaining a high health score than those who do not practice it.

The results presented in Table 5 also indicate that there exists statistically significant difference between the mean health score of people who practice "yoga nidra" and who do not practice it. People practicing "yoga nidra" have a high mean health score of about 55, compared to about 32 for those who do not practice it. Yoga nidra has been reported to have benefits such as deep relaxation, reduced stress, healing of trauma, reduced chronic pain, symptoms of PMS symptoms and type 2 diabetes and improved sleep and reduces insomnia (Eight Benefits of Yoga Nidra.

<https://ambujayoga.com/blog/benefits-of-yoga-nidra/> - retrieved 8<sup>th</sup> October 2020). There exists statistically significant difference between the mean health score



of young, middle and old age yoga practitioners. The mean health score increases from the young to the middle and to the old aged (>55 years age) yoga practitioners (Table 4). Because yoga classes are free from the stigma of medical care, yoga may be particularly useful for older adults with cultural and personal beliefs that create resistance to medical treatment (i.e., fear of needing help or being perceived as weak). Since yoga can simultaneously provide gentle and effective physical exercise as well as teach increased emotional and cognitive control, it may be particularly well-suited to older adults. Older adults need physical exercise to maintain functionality and independence. Likewise, an increased capacity for self-regulation can help older adults to maintain a sense of competence and self-sufficiency (Bonura 2007).

#### **Conclusion**

This study has shown that majority of the yoga practitioners have high to medium level of health. A very high proportion report slight and very much improvement

in the psychological and physical health parameters due to yoga practice with or without treatment /medicines, when compared to the base line condition of with or without treatment / medicines alone. Yoga practitioners are found to have very less hostility towards others and maintain good level of calmness, which could contribute to better wellbeing for them. Age and months of yoga practice have significant contribution to the health of the respondents. People who practice “yoga nidra” are found to have a very high chance of maintaining good health than those who do not practice it. Such results assume importance, especially in the context of the uncertainty and anxiety created by the present COVID-19 pandemic, which could also lead to psycho-somatic disorders among people. Further, this is where the print and visual media can play an important role by making available the positive results of studies on yoga, meditation etc., which could motivate more people to practice such techniques and get benefits.

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