

Difference between Blood Pressure, Heart Rate and Global Stretch Before and After 8 Weeks of Standardized Meditation and Yoga Asanas

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Abstract

Yoga is a discipline of exercises for the body and mind originated in India. It has a series of benefits for health. However, it is challenging to find a standardized system of meditation and Asanas. A simple application would facilitate the application to a large population. It will also help scientific reproducibility.

The purpose of this study was to test the effects of a simple and reproducible 8-week Yoga exercise routine for blood pressure (measured in mmHg), heart rate (bpm) and global stretching (cm).

Twenty-three male subjects with a mean age of 57 ± 9 years old underwent eight sessions of meditation and carefully selected Asanas.

Subjects were evaluated at baseline, 8-weeks later prior to the first treatment, and then 8-weeks after initiating the treatment program. Baseline data were compared with the Treatment period using a paired t-test ($p = 0.05$). Blood Pressure, Heart Rate, and Global Stretching had a p-value of 0.001, 0.04 and 0.001 respectively. The Yoga program utilized in this study helped to improve blood pressure, heart rate, and global stretching. A simple method of learning, practicing and standardizing meditation and Asanas worked well with positive results.

Keywords: Blood Pressure; Heart Rate; Global Stretch; Meditation; Yoga Asanas

Introduction

Yoga was created more than 3000 years ago. It has its origin in India and means join in union [1]. Many of its health benefits seem to come from the exercises practiced with focal attention [2,3].

Yoga has increased its popularity in Western cultures [4-6]. Modern Western Yoga uses, in general, the triad base of meditation (Dhyana), postures (Asanas) and breathing (Pranayama) [7-9] with a goal of joining body and mind for overall well-being [10].

Researchers have been evaluating the role of Yoga in improving measures of health. It may help to develop muscle strength, flexibility, and range of motion, increases energy levels and improves sleep quality [11,12]. Other studies showed that Yoga helps in terms of thermoregulation, cardiovascular health, and coronary artery disease; it increases hormone levels, enhances immune response, lowers hypertension, improves respiratory functions, and have a positive role in diseases like bronchial asthma and diabetes [11,12]. Numerous scientific investigations and systematic reviews have confirmed the impacts of yoga on the improvement of mood disorders, such as depression [11-16] and anxiety [13,17-22]. Other works suggest that practicing of yoga is correlated to a decreased number of episodes of

major depression, and lower risk of dysthymia [11,14,15,19,20,23-25]. Some meta-analyses and systematic reviews show that conventional antidepressants equally effective when compared to yoga or meditative therapies in the treatment of depression and anxiety [26,27]. Yoga also relieved the stress and improved insomnia symptoms [28]. Additional data imply that these systems are also connected with variations in response to stress and anxiety [13,29,30]. Furthermore, the positive outcomes of yoga improved the feeling of well-being and contentment with life [31].

Practicing yoga can be more engaging than pharmacological treatments for some people. Maybe because it has no collateral effects, maybe because it permits active participation in therapy. Yoga may help in times of significant stress, anxiety, sadness or depression [13]. The most exciting part is that Yoga empowers the individual to self-manage [13]. It is inexpensive or can be free after learned. Additionally, practicing yoga can be recognized as something that naturally affects the body biochemicals differently from the perception that pharmaceutical interventions may arise.

Yoga is a far-reaching method. There are different sorts of meditation and more than 500 postures, also known as Asanas [32]. This large quantity of Asanas is perfect for diversifying exercises or dosing the intensity level based on skill, age or physical fitness (Rosario and Leite 2019). Notwithstanding, for science purposes, it is essential to have standardization [14,15]. In this work, we used the Yoga and meditation methodology proposed by Rosario and Leite (2019). The aim is to verify the effectiveness of Yoga for decreasing blood pressure and heart rate while evaluating changes in muscular flexibility. The main difference between this work and previous studies is the use of a secure method of meditation and Asanas, which is easy to reproduce scientifically and to practice at home in any age group even without previous experience with yoga.

Methodology

Twenty-three male subjects, with blood pressure higher than 140/90 mmHg, mean age of 57 years old, free from neurological or psychiatric problems, participated in this study. They have no changes in their blood pressure medication. There was also no alteration in their physical activities.

Participants were assessed a three points during the study. The first assessment (FA) just before starting the study. The second (SA) after eight weeks with no treatment. Finally, the third (TA) after the 8-week treatment.

Thus, before the study begins participants had their first assessment (FA) with blood pressure measured with a sphygmomanometer and heart rate measured in beats per minute (bpm) at the radial artery. Also, they had their global stretch measured using the third finger soil test [33]. This test is performed in a standing position. The subject flexes the trunk with the knees extended. The distance between the third finger and the floor in centimeters is marked with a measuring tape. The smaller the distance between the finger and ground the better.

All subjects participated in the control group through 8 weeks without any kind of treatment. After all measures were taken again (SA), the 8-week training sessions started to all of them. The training program was performed for 1 hour on a weekly basis: 30 minutes for meditation and 30 minutes for Asanas. In these sessions, they learned the foundations of Progressive Self-focal Meditation and increased the Asanas’ difficulty progressively. They underwent the same assessment 24 hours after the eighth Yoga session (TA).

Easy method of asanas and meditation according to Rosario and Leite (2019)

Progressive self-focal meditation (PSM)

The 8-week progression for the Self-focal Meditation followed the schedule illustrated on the table 1 below.

Week	Meditation Skills Learned
1 and 2	Diaphragmatic Breathing: deep and slow breathing exercise.
3 and 4	Progressive muscle relaxation: contraction of small muscle groups followed by induced relaxation of the body.
5 and 6	Shalom: visualization of this word, firstly in two cards (SHA - LOM). After this, the subject imagined the “SHA” while inhaling, and vocalize with pursed lips “LOM” while exhaling.
7 and 8	Meditation on the flow of thoughts: focusing on the flow of thoughts without analysis, judgment, or engaging with them.

Table 1: Weekly progression of self-focal meditation.

Asanas

Asanas are the postures of Yoga. The Asanas used in this work were as follows, described by Taccolini [32]:

- Ardha (Half) Bhadrasana (Gracious Pose)
- Rája (Royal) Padasana (Standing Pose)
- Raja (Royal) Prathanasana (Pray Pose)
- Sukha (Happiness or Easy) Vrikshasana (Tree Pose)
- Sukha (Happiness or Easy) Janurdhwa (Knee) Shirshasana (Head Pose)
- Grivel (Neck) Vartenasana (Spinning Pose)
- Bahuvartenasana (Shoulder Raising Pose)
- Raja (Royal) Trikonasana (Triangle Pose)
- Raja (Royal) Hastinasana (Elephant Dance Pose)
- Vajra (Indra’s thunderbolt) Hamsasana (Swam Pose)
- Raja (Royal) Dharanasana (Bow Pose)
- Ardha (Half) Bhujangasana (Snake Pose)
- Uttara (North) Shavasana (Corpse Pose)
- Sukha (Happiness or Easy) Bahupadasana (Foot Arm Pose)
- Raja (Royal) Bahupadasana (Foot Arm Pose)
- Ekapada (One foot) Chalanasana (Churning Pose).

Asanas advanced from the simplest to the most complex according to Rosario and Leite (2019).

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana	Ardha Bhadrasana
Healthy Raja Pada	Raja Padasana	Raja prathanasana	Raja prathanasana	Sukha Vrikshasana	Sukha Vrikshasana	Sukha Janurdhwa shirsha sana	Sukha Janu rdhwa shirshasana
Griva Vartenasana	Griva Vartenasana	Griva Vartenasana	Griva Vartenasana	Griva Vartenasana	Griva Vartenasana	Griva Vartenasana	Griva Vartenasana
Bahuvartenasana	Bahuvartenasana	Bahuvartenasana	Bahuvartenasana	Bahuvartenasana	Bahuvartenasana	Bahuvartenasana	Bahuvartenasana
Raja Trikonasana 1	Raja Trikonasana 1	Raja Trikonasana 1	Raja Trikonasana 2	Raja Trikonasana 2	Raja Trikonasana 2	Raja Trikonasana 3	Raja Trikonasana 3
Healthy Hastina	Hastinasana	Hastinasana	Hastinasana	Hastinasana	Hastinasana	Hastinasana	Hastinasana
Vajra ham sasana	Vajra ham sasana	Vajra ham sasana	Vajra hamasana	Raja dharanasana	Raja dharanasana	Raja dharanasana	Raja dharanasana
Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana	Ardha Bhujangasana
Uttara Shavasana	Uttara Shavasana	Uttara Shavasana	Uttara Shavasana	Uttara Shavasana	Uttara Shavasana	Uttara Shavasana	Uttara Shavasana
Sukha bahupadaheals	Sukha bahupadaheals	Sukha bahupadaheals	Sukha bahupadaheals	Sukha bahupadaheals	Sukha bahupadaheals	Raja bahupadasana	Raja bahupadasana
				Chalana sana	Chalanasana	Chalanasana	Chalanasana

Table 2: Weekly progression of Asanas.

Statistical analysis

Subject age is presented as mean ± standard deviation.

Two periods were compared: the treatment period (TP) and the control period (CP).

The CP was obtained by subtracting the values of the SA from the FA. Thus, it represents the period of the first week without treatment results. The following formula illustrate this:

$$CP = FA - SA$$

The TP was found subtracting the TA from the SA. It represents the 8-week Yoga treatment period results. TP has this formula:

$$TP = SA - TA$$

A larger positive TP value is associated with a blood pressure, heart rate or global stretching improvement.

Next, a paired t-test compared the TP result with the CP result. A priori statistical significance was set a $p = 0.05$.

Results

The twenty-three subjects had a mean age of 57 ± 9 years old at the beginning of the study. Table 3 shows the mean values and standard deviations for blood pressure, heart rate, and global stretch for both TP and CP.

	FA	SA	TA
Blood Pressure (mmHg)	167/86	169/85	136/81
Heart Rate (bpm)	94	93	86
Global Stretching (cm)	13.4	13.0	7.1
	CP = FA - SA		
		TP = SA - TA	

Table 3: Mean values for the variables: blood pressure (mmHg), heart rate (bpm) and global stretching (cm) in the first assessment (FA), second assessment (SA) after the 8-week without treatment period, and third assessment (TA) after the 8-week without treatment period. FA minus SA equals Control Period (CP). SA minus TA equals Treatment Period (TP).

Table 4 shows the p-value for the statistical comparison between TP and CP. The heart rate p-value was less significant than the other two variables.

Variables tested	p-value
Blood Pressure (mmHg)	0.001
Heart Rate (bpm)	0.04
Global Stretching (cm)	0.001

Table 4: Comparison between the treatment period (TP) and the without treatment period (CP) for the variables: blood pressure (mmHg), heart rate (bpm) and general stretching (cm) using the paired t-test. Statistical significance was set a $p = 0.05$.

Discussion

Eight-weeks of a simple set of Yoga Asanas and Meditation was enough to significantly reduce blood pressure and heart rate while increasing stretching capacity. This study supports previous ones that showed a reduction in stress [21] and anxiety [26,27,34], although our research did not assess these symptoms directly. Nevertheless, the drop in blood pressure and heart rate are customarily connected to the alleviation of stress and anxiety.

Other researchers have reported similar results to those of this paper [18]. Probably, the results could outstand even more, especially for heart rate variable, if the patients were using less medication. However, reducing their dosage could mean a threat to their lives.

While a great number of Asanas can make difference for advanced practitioners, an inexperienced population obtained benefits from a simple practice. This means an easier way to change habits and saving lives. The 8-week treatment protocol for training PSM and an easy progression of Asanas went well since all the subjects were able to learn both postures and meditation in the stated time, obtaining positive outcomes for their health.

This research covered only meditation (PSM) and postures (Asanas). A simple model for learning breathing techniques (pranayama) would be a valuable asset as well [35-44].

Conclusion

The subjects of this research obtained improvements for blood pressure, heart rate, and global stretching. A simple method of learning, practicing and standardizing meditation and Asanas worked well with positive results. Further studies may include women and other types of health problems. Adding simple pranayama techniques may further increase the results and should be tested in subsequent researches as well.

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