ORIGINAL RESEARCH

An Analysis of Yoga's Impact on the Body's Sympathetic Nervous System

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ABSTRACT

Introduction: Yoga involves the learner in the healing process; by actively participating in their path to wellness, the student experiences internal healing rather than external healing, and a higher feeling of autonomy is attained. **Materials and Methods:** 60regular yoga practitioners and 60 regular non-yoga practitioners over the age of 35 participated in an observational cross-sectional study. A random selection of yoga practitioners was made from among many yoga centers. Non-yoga practitioners were chosen at random. **Results:** anthropometric assessments of participants in the control and research groups.The control and research groups' heights (in centimetres):Control Group mean + SD: 166.29±9.320 cm, Study Group Mean SD: 166.54±9.969cmThe individuals in the research group and the control group did not vary significantly in height (p=0.865).Weight (Kg) of study and control groups: 66.80±10.81 = mean + SD of control group The research group's mean SD was 64.89 ±6.381. The weight of the participants in the study group and the control group does not vary significantly (p=0.208). **Conclusion:** According to this scientific research, yoga heals many important organs and increases their capacity to withstand stress. It also causes a variety of physiological and biochemical changes in the body.

Keywords: Yoga, sympathetic, nervous system, Anxity

INTRODUCTION

Yoga is regarded as one of the most significant, useful, and efficient tools for resolving a variety of psychological issues. Benson studied mindfulness meditation, which stresses the stabilisation of attention by accepting discursive sensory events as transient and observing them without affective reaction or attachment, and transcendental meditation (TM), in which the meditator recites a mantra that is given to him or her by the meditation instructor. In addition to psychological outcome measures that show relaxation is a characteristic response that occurs during relaxation, Benson demonstrated that TM and mindfulness meditation produce physiological changes that are indicative of a heightened activation of the parasympathetic nervous system and lowered sympathetic activity. These changes include decreased oxygen consumption and carbon dioxide elimination, lowering of heart and respiratory rates, and a marked decrease in arterial blood lactate concentration (e.g.).(1,2) Benson assumed that the relaxation response applies to meditation in general and that it is helpful to decontextualise various forms of meditation from their cultural and religious foundations, even though he discovered it by researching mindfulness and TM: "to understand the psychophysiological aspects of meditation, it should first be conceptually denuded of its cultural and religious biases".(3)Crucially, the achievement of a relaxation response during meditation has been reliably documented in the scientific literature and validated by several follow-up studies.(4–7)

Young and Taylor8 offered an evolutionary explanation based on Benson's methodology, characterising meditation as a "wakeful hypometabolic state of parasympathetic dominance".(8)Similar to hibernation, the hypometabolic state experienced during meditation is a profound condition of rest during which the practitioner is alert and aware.(8–9) The state of being awake and vigilant was later termed “tonic alertness,” which indicates a state of optimal vigilance where attention is sustained for a prolonged period of time.(10) Numerous studies show a high correlation between sudden cardiac death and non-sudden cardiac death and damaged ANS (e.g., increased sympathetic activity or reduced vagal activity). The importance of

lifestyle changes in the management, prevention, and recovery from cardiovascular diseases is also becoming more widely acknowledged. Yoga is a very well-liked and actively studied lifestyle change. It has been suggested that regular yoga practice might help prevent illness, especially by streamlining autonomic processes, primarily via vagal efferent modulation.(11)

Everyone experiences stress because of our modern lifestyle which is highly competitive, challenging and with full of tensions.Twelve Chronic stress increases sympathetic discharge for a longer time and is characterised by a change in the set point of hypothalamo-pituitary axis activity, leading to immediate effect on heart rate, blood pressure, temperature, respiratory rate, catecholamines and corticosteroids. Thus sympathetic over activity for a longer time is associated with cardiovascular morbidity and mortality.(13) such situation can be tackled by simple lifestyle modification including diet, exercise, Yoga and relaxation techniques. The first principle is the human body is a holistic entity comprised of various interrelated dimensions inseparable from one another and the health or illness of any one dimension affects the other dimensions. The second principle is individuals and their needs are unique and therefore must be approached in a way that acknowledges this individuality and their practice must be tailored accordingly. The third principle is yoga is self-empowering; the student is his or her own healer. Yoga involves the learner in the healing process; by actively participating in their path to wellness, the student experiences internal healing rather than external healing, and a higher feeling of autonomy is attained. The fourth principle is that the quality and state of an individual's mind is crucial to healing. When the individual has a positive mind-state healing happens more quickly, whereas if the mind state is negative, healing may be prolonged.

MATERIALS AND METHODS

60 regular yoga practitioners and 60 regular non-practitioners over the age of 35 participated in an observational cross-sectional study. A random selection of yoga practitioners was made from among many yoga centers. Among the non-teaching employees non-yoga practitioners were chosen at random. The ethical committee granted the study its ethical clearance.

Reaction of blood pressure to prolonged Each participant was instructed to sit comfortably in a chair for the hand grip exercise. The individual was then instructed to use their dominant hand to exert their maximum hand grip strength on a hand grip dynamometer. After that, the participant was instructed to use their dominant hand for five minutes (at least three minutes) at 30% of their maximum grip strength. The non-dominant hand's diastolic blood pressure was recorded both at rest and during hand grip at one-minute intervals. Women with significant medical or surgical conditions and those who exercised regularly were not included. Before and after 16 weeks of yoga instruction, the women's medical history, physical and general exams, anthropometric measurements, vital signs, and stress levels were recorded using the Zung self-rated anxiety scale. The paired-t test was used for statistical analysis, and the results are shown as mean ± SD.Following an explanation of the study's objectives, the participants provided signed informed permission. Prior to and after three months of yoga instruction, the cardiovascular state was evaluated by recording the following parameters: resting heart rate, resting blood pressure, blood pressure response to standing, and blood pressure reaction to handgrip. No food or medications taken orally or by any other method were allowed three hours before the test on the day of the test, nor were cigarettes or other foods containing nicotine allowed. The patient was given an explanation of the processes and instructed to unwind emotionally and physically for half an hour prior to capturing the aforementioned parameters.

RESULTS

Age (Years) of control and study Group : Mean Age + SD of control Group- 43.35±6.208MeanAg SD of study Group - 43.21±6.167 There is no significant variation in age of both Groups.[Table 1].There is no significant variation in age of both Groups.

Table 1: Age (Mean + SD) of control and study Group

Parameter	Control Group	Study Group	Level of significance
Age (Years)	43.35±6.208	43.21±6.167	p= 0.833

anthropometric assessments of participants in the control and research groups.The control and research groups' heights (in centimetres):Control Group mean + SD: 166.29±9.320 cmStudy Group Mean SD: 166.54±9.969cmThe individuals in the research group and the control group did not vary significantly in height (p=0.865).Weight (Kg) of study and control groups: 66.80±10.81 = mean + SD of control group The research group's mean SD was 64.89 ±6.381. The weight of the participants in the study group and the control group does not vary significantly (p=0.208).Study and control groups' BMIs (kg/m2): Mean + SD of the control group = 25.87 + 3.60 Study Group Mean ± SD: 25.13 + 3.10The research group's and the control group's individuals' BMIs vary significantly (p=0.015). [Table 2].

Table 2: Anthropometric measurements Mean ± SD of control and study group

Parameters	Control Group	Study Group	Level of significance
Height (cms)	166.29±9.320	166.54±9.969	0.865
Weight (kg)	66.80±10.81	64.89±6.379	0.208
BMI (*kg*/m2)	25.87±3.60	23.13± 3.10	0.015

physiological characteristics of participants in the control and research groups. The research and control groups' resting pulse rates (beats per minute): The control group's mean ± SD was 74.80±5.488.Study group mean±SD: 72.59±5.280

Subjects in the study group had a significantly lower resting pulse rate (p=0.003) than those in the control group. Resting Respiratory Rate for Study and Control Groups (cycles/min): Control Group Mean ± SD: 16.01± 3.602 Study group mean± SD: 14.0± 3.489Subjects in the study group had a significantly lower resting respiratory rate (p=0.001) than those in the control group. The study group's mean ± SD of the control group's resting systolic blood pressure (mm Hg) was 125.41± 7.104. Study group mean SD: 124.01 ± 6.079Subjects in the study group saw a negligible (p=0.115) drop in their resting SBP when compared to the non-yogic group. The study group's mean ± SD of the control group's resting diastolic blood pressure (mm Hg) was 84.39± 6.007 Study group mean± SD: 82.20± 5.102 Subjects in the study group had a significantly lower resting diastolic blood pressure than those in the control group (p=0.004). [Table 3].

Table 3: Physiological Parameters (Mean ± SD) of subjects in control and study group.

Parameters	Control Group	Study Group	Level of significance
Resting PR (bpm)	74.80±5.488	72.59±5.280	0.004
Resting PR (Cycles/min)	16.01± 3.602	15.02± 3.489	0.001
Resting SBP (mmofHg)	125.41±7.104	124.01±6.079	0.115
Resting DBP (mmofHg)	84.39±6.007	82.20±5.102	0.005

*p <0.05: Significant, ** p <0.01: Highly significant, *** p <0.001: Very highly significant

DISCUSSION

The autonomic response of many people has been studied using the cold pressor reaction, which involves submerging the hand in cold water to provide a painful stimulus. The efferent fibres for this reaction are sympathetic fibres, whereas the afferent fibres are pain fibres that are activated by submerging the hand in cold water. A normal response to the cold pressor test is defined as a 15–20 mm Hg rise in systolic and diastolic blood pressure of 10 mm Hg. The outcome of elevated stress and anxiety is sympathetic arousal, which raises catecholamines and cortisol levels via the hypothalamic-pituitary-adrenal axis.14–15 Fatigue, headaches, backaches, neck and shoulder discomfort, stomach issues, pain before and after menstruation, a sense of anxiety, loneliness, frustration, irritability, and trouble focussing are some of the signs of stress that women experience. These strains are exacerbated by social constraints, familial obligations, and subtle forms of discrimination at work.16 Additional significant processes that explain how yoga meditation reduces anxiety include: a) a drop in plasma cortisol, a key mediator of stress, and a decrease in plasma phenylalanine, which is linked to altered brain activity, during meditation b) Since low levels of the central inhibitory neurotransmitter gamma amino butyric acid (GABA) are linked to increased anxiety, many yoga positions exhibit a rise in GABA levels.17–18

The identical results found in this investigation were reported by Kurwale et al. (19) and Gawali et al. (14). All of the body's systems are stimulated and balanced by yoga. Increased emotional stability, mental clarity, and overall wellness are the outcomes.20

CONCLUSION

We might infer that frequent yoga practice lateralised the autonomic function towards parasympathetic regulation and dampened the sympathetic drive. Following the treatment, there was a noticeable decrease in a number of stress-related symptoms. Additionally, there was evidence of increased physiological relaxation and reduced autonomic reactivity. These findings imply that the chosen breathing method has a significant parasympathetic nervous system boosting impact or a sympathetic nervous system calming effect. According to this scientific research, yoga practice alters the body's physiology and biochemistry, heals many important organs, and increases their capacity to withstand stress.

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