Review of Shavasana Studies Conducted at JIPMER During 2001-2002

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ABSTRACT

The modern age is the age of stress and stress-induced disorders that pose a great challenge to the present society. Yogic techniques in general and Shavasana in particular are known to improve psychosomatic health and enhance one's ability to withstand and combat stressful situations. Shavasana is a classical yogic technique whose effectiveness in producing psychosomatic relaxation has been well documented. Shavasana has also been found to be useful in controlling psychosomatic ailments such as hypertension and bronchial asthma. It has been reported that Shavasana produces a significant decrease in heart rate and blood pressure. However most of the previous studies were based on training of longer duration. As no study has been done to determine the effectiveness of Shavasana training of short duration on physiological functions, we planned to determine the effectiveness of Shavasana training of short duration. In one study at JIPMER (Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry), Shavasana training of seven days enhanced one's ability to respond to stressful stimuli as documented by response to cold pressor test. In a second study, Shavasana training of four weeks normalized the sympathetic response to isometric handgrip in hypertensive patients. In these patients there was also a significant reduction in resting blood pressure, heart rate and rate-pressure-product.

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In a third study, Shavasana training for six weeks increased the heart rate variability in normal young adults signifying an improved cardiac modulation by autonomic nervous system.

Key words: Shavasana, cold pressor test, heart rate, blood pressure, hypertension, heart rate variability.

Introduction

Recently, there has been an increased awareness and interest in health and natural remedies. Yoga is an effective and time-tested method for improving our health as well as prevention and management of diseases especially psychosomatic and degenerative disorders. The scientific-spiritual discipline of yoga is the most precious gem of our cultural heritage and is being practised in India in an unbroken tradition for thousands of years. The first sacred book of humankind, Rigved has described the yogic meditation thus: “Wise persons worthy of yoga meditate on and establish their intellect in the Divine who is omniscient, omnipotent and creator” (युज्ञते मन उत मुज्ञते धिये विप्रा विग्रस्य बृहत्ता विपन्नित्ते! वि हेता दधे वयुनाविद्ये इन्नही देवस्य सचिति: परिष्मुति:!! ऋग्वेद.).

Yajurved says, “Practising yoga again and again, enhancing mental and physical strength for mutual friendship and protection, we meditate on the Divine who is omnipotent and affluent” (यथेष्टे यथाते तवस्तर बाजे वाजे हवामहे!! सख्यय इत्रमूत्ये!! यजुर्वेद.).

The role of yoga in promoting health and prevention and cure of diseases like hypertension and bronchial asthma (Datey et al., 1969; Wilson et al., 1975) has been established by the scientific studies. Yogic techniques produce consistent physiological changes and have sound scientific basis (Madanmohan et al., 1983; Wallace et al., 1971).

Modern age is the age of stress and stress-induced disorders are posing a great challenge to the present society. Shavasana is a classical yogic technique whose effectiveness in producing psychosomatic relaxation has been well documented. In an earlier work from our laboratories, we have reported the effectiveness of Shavasana in
producing psychosomatic relaxation (Madanmohan et al., 1983). Other workers also have demonstrated the effectiveness of Shavasana in combating stress (Bera et al., 1998; Udupa et al., 1978). However, most of the previous studies are based on Shavasana training of longer duration. As no study has been done to determine the effectiveness of Shavasana training of short duration on physiological functions, we planned to determine if Shavasana training of short duration could modulate cardiac autonomic activity and cardiovascular response to stress.

In one study we have reported the effect of Shavasana training of 1 week on cardiovascular response to stress induced by cold pressor test (Madanmohan et al., 2002).

In the second study, we determined the effect of Shavasana training of 4 weeks on cardiovascular response to isometric handgrip test in hypertensive patients.

In the third study we have measured the effect of Shavasana training of 6 weeks on cardiac autonomic balance as measured by frequency domain analysis of heart rate variability and sympathovagal balance.

Study I: Modulation of Cold Pressor-induced Stress by Shavasana in Normal Adult Volunteers (Madanmohan et al., 2002)

This study was planned with the following objectives:

i) To see whether Shavasana training of very short duration can modulate the physiological response to stress induced by cold pressor test (CPT), and

ii) To determine the possible mechanism(s) involved in achieving this ability.

Ten healthy volunteers (22-30 yr, 60-84 kg, 160–178 cm) were recruited for the study. They were taught Shavasana and practised the same for 15 minutes daily under our direct supervision for a total duration of seven days. The technique of Shavasana is given elsewhere (Swami Gitananda, 1981). Recordings were taken two hours after light
breakfast. Lead II ECG was recorded and RR interval variation (RRIV) was measured from 150 successive RR intervals and expressed as the coefficient of variation (CV) about mean RR interval from RR interval sequence (CV = SD/mean X 100). Deep breathing difference (DBD) was determined by asking the subject to breathe deeply and uniformly at a rate of six breaths per minute, taking 5 seconds for inspiration and 5 seconds for expiration. Signals obtained from the ECG were analysed with the help of a data processing software (Bio Windows, Modular Instruments Inc., USA). Maximum and minimum heart rate (HR) during each cycle was identified from the HR plot and the difference between them was calculated. Mean of the differences during six such successive respiratory cycles was calculated and rounded to the nearest whole integer and expressed as DBD (Mathias and Banister, 1992).

CPT was performed by asking the subject to immerse his/her hand for two minutes in cold water maintained at 4 ± 0.5 °C. Blood pressure (BP) and HR were recorded using automatic non-invasive BP apparatus (Press-Mate BP 8800, Colin Corporation, Japan). Readings were taken before the immersion, at 30 seconds intervals during the immersion and at 1, 2, 3, 4 and 5 min during the post-immersion period. Rate-pressure-product (RPP), which is an index of myocardial oxygen consumption (Gobel et al., 1978), was calculated as a product of HR and systolic blood pressure (SP) divided by 100 (RPP = HR × SP × 10^{-2}). After seven days of Shavasana training, measurements were taken before and after a session of Shavasana practice and the data was analyzed using Student’s paired ‘t’ test. A ‘p’ value of less than 0.05 was accepted as indicating significant difference between the compared values.

Basal RRIV was 5.82 ± 0.58 (SE) and after the Shavasana session, it increased to 6.47 ± 1.12. After Shavasana practice, DBD increased significantly from 21.53 ± 2.85 to 24.78 ± 2.72 (p < 0.01). RRIV and DBD are known to be reliable and reproducible measures of cardiac parasympathetic activity (Ewing, 1992; Mathias & Bannister, 1992). Hence the present study shows that a session of Shavasana increases the cardiac parasympathetic activity. After practice of Shavasana the HR decreased from 72.6 ± 3.17 to 68.2 ± 2.71, the decrease being statistically significant (p < 0.05). However there was no change in resting SP and diastolic pressure (DP). RPP also decreased significantly (p<0.05) from 78.3 ± 4.29 to 73 ± 4.18. It is clear from the
present study that 7 days of *Shavasana training* is sufficient to enable a person to reduce the resting HR but not BP following a *Shavasana* session. Udupa et al. (1978) also have found that 2 months of *Shavasana* training doesn’t affect the resting BP. A significant decrease in resting RPP after *Shavasana* indicates a decrease in load on the heart and myocardial oxygen consumption (Gobel et al., 1978). Immersion of hand in cold water produced a marked increase in HR, SP, DP and RPP. These changes can be explained on the basis of increased sympathetic activity with release of norepinephrine and epinephrine (Fagius et al., 1989). After the practice of *Shavasana*, the increase in these parameters was blunted indicating that *Shavasana* decreases the sympathetic activity.

In conclusion, our study has demonstrated that a session of *Shavasana* enhances parasympathetic activity, decreases sympathetic activity and reduces load on the heart. This study also shows that *Shavasana* can improve one’s ability to withstand stress induced by CPT. It is interesting to note that one can achieve this ability even within 7 days of *Shavasana* training.

**Study II: Modulation of Stress Induced by Isometric Handgrip Test in Hypertensive Patients following Yogic Relaxation Training**

Although it is known that yoga training is effective in the management of essential hypertension (Datey et al., 1969; Patel & North, 1975), literature is deficient on the effectiveness of *Shavasana* training of short duration in the management of hypertension. Moreover the effect of yoga training on cardiovascular response to isometric handgrip (IHG) test in hypertensive patients has not been studied. Hence we planned to study the effect of yoga training of four weeks on resting HR, BP, RPP and cardiovascular response to IHG test in hypertensive patients.

13 male patients (41-60 yr) of uncomplicated essential hypertension (duration 3 to 15 yr) attending JIPMER staff clinic were recruited for the present study. They were given training in the following yogic techniques with *Shavasana* as the main practice: naukasana, viparitakarani, matsyasana, shashankasana, pranava pranayama, savitri pranayama, chandra anulom pranayama and
Shavasana with kaya kriya. They practised these techniques 1 hour daily, 6 days a week for a total duration of 4 weeks under our direct supervision. SP, DP, pulse pressure (PP), mean pressure (MP), HR & RPP were recorded before yoga training (control) and at weekly intervals during the 4 weeks of yoga training. Response to IHG test was measured before and at the end of 4 weeks of yoga training. IHG test was done using inflated cuff of sphygmomanometer and the pressure was maintained at 1/3rd of maximum voluntary contraction. The data was analyzed using Student’s paired ‘t’ test. A ‘p’ value of less than 0.05 was accepted as indicating significant difference between the compared values.

Yoga training produced a decrease in HR that was statistically significant from the second week onwards. SP and DP decreased significantly from third and second week respectively. RPP decreased significantly from third week onwards. Our results are in agreement with those of earlier workers who have found that yoga training produces a significant decrease in HR and BP (Datey et al., 1969; Patel and North, 1975; Murugesan et al. 2000). Prior to yoga training IHG test produced an insignificant rise in HR, SP, DP, PP, MP and RPP, and statistically significant (p<0.05) rise in SP indicating subnormal cardiovascular autonomic reflex response. After yoga training, isometric handgrip produced a highly significant (p<0.02) rise in all parameters except PP. Our results demonstrate that the physiological response to IHG test is inadequate in hypertensive patients and the responsiveness is restored by yoga training of 4 weeks duration.

In conclusion, our study shows that yoga training of 4 weeks restores the autonomic regulatory reflex mechanisms in hypertensive patients in addition to producing a significant reduction in resting HR, BP and RPP.

Study III: Effect of Shavasana on Heart Rate Variability in Normal Student Volunteers

The effect of Shavasana on HR and BP is well known. However, its effect on heart rate variability (HRV) and sympathovagal balance (SVB) has not been documented. Hence, we planned to study the effect of Shavasana training on HRV as measured by SVB and RRIV.
six school children (13 boys and 13 girls), aged 15-17 years, were recruited for the study. Their resting HR, BP and lead II ECG were recorded in supine position. A 5-minute RR-interval series was subjected to fast Fourier transformation to obtain RR-interval power spectrum and coefficient of variation of RR-intervals (CVRRI) was also calculated (Task force report, 1996). SVB was calculated as the ratio of low frequency (0.04 – 0.15 Hz) and high frequency powers (0.15 – 0.40 Hz). The subjects were given Shavasana training and practised the same under our direct supervision four days a week for a period of six weeks. They were also instructed in sectional breathing with emphasis on abdominal breathing. The above-mentioned parameters were recorded once again after 6 weeks of Shavasana training.

Shavasana training produced a significant decrease in HR, SP and DP (p<0.01), MP (p<0.001) and RPP (p<0.05). There was a significant increase in total power of the RR-interval spectrum (p<0.01) and CVRRI (p<0.05). However, Shavasana training produced no significant change in SVB. It is concluded that the practice of Shavasana increases heart rate variability in normal young adults signifying an increased vagal modulation of HR.

References


Authors Note

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