A study of the effect of individual Asanas on blood pressure

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Asana means a steady and pleasant posture of the body. Asanas are to be performed without strain. Undue stretching in some Asana may do more harm than benefit. This study of individual Asana was undertaken to understand the effect of changing postures on the blood pressure. Twenty five first year MBBS students in the age group of 16-19 years performed Sukhasan, Vajrasan and Dhanurasan in the Department of Physiology. The blood pressure was measured by the mercury sphygmomanometer by standard method while the Asana were being performed. In Sukhasan blood pressure was the lowest 116.4 ± 7.21 / 76.1 ± 7.34. The pressure increased slightly in Vajrasan to 119.5 ± 7.82 / 81.4 ± 6.2. It was the highest recordable in Dhanurasan (125.2 ± 8.23 / 84.8 ± 7.78). Thereby, indicating that the pressure is lowest in Sukhasan, and this Asana may be performed regularly in meditation for calming the overworked heart.

Key words: Asanas, Blood Pressure, Yoga, Meditation


Asana means a steady and pleasant posture of the body. When the mind is not in a pleasant state the individual cannot feel or even think properly. The human body is so harmoniously arranged that if even any minutest part of it were hurt a little, the whole system become disturbed. So to comprehend a thing, i.e. to feel a thing by the heart clearly, the practice of Asana, the steady and pleasant posture, is necessary.1

Asanas and Pranayama have beneficial effects on the body: They improve the functions of different systems of the body, increasing longevity. They bring equipoise between the psychic and somatic aspects of bodily functions. They help in curing certain diseases and thus ultimately improve the quality of life. They invigorate the activity of lungs and heart. They calm the mind, increase the concentration and give the ability to cope with tension. They are a complete system for personal development, promoting total physical and spiritual well being.2

However, the asanas are to be performed without strain. Undue stretching in some asanas may do more harm than benefit. Old reports have indicated that some asanas are harmful for heart disease and hypertensives and should be performed with caution.3 This study of individual Asanas was undertaken to understand the effect of changing postures on the blood pressure.

Methodology
Twenty five first year MBBS students in the age group of 16-19 years performed Sukhasan, Vajrasan and Dhanurasan in the department of Physiology. The students were not regular practitioners of yoga (Fig. 1). Hypertensives were excluded from the study as Dhanurasan increased their blood pressure. The students who were not comfortable or were unable to do the asanas due to causes such as injury were excluded. The students were healthy without any ailments.

Initially, demonstration was given followed by supervision was done while performing the asanas. The blood pressure was measured by the mercury sphygmomanometer by standard method while the Asanas were being performed.

The pressure was recorded after a degree of stability was reached i.e. when the individual maintained the posture comfortably. In Dhanurasan, the pressure was taken while performing the “bow posture” with the pressure cuff tied on the hand catching the ankle. The asanas were performed without causing undue pain. Students who were uncomfortable while performing the asanas were excluded from the study. Students who had suffered leg trauma or were hypertensives were also excluded.

The technique of the asanas taught to them is described below:
Sukhasan (comfort pose)

In Sukhasan, the subject sits in a comfortable posture with one leg below the other. With the abdomen in, chest out, chin parallel to the ground, the shoulder blades are drawn gently together. The hands are rested, with palms facing upward at the juncture of thighs and the abdominal region. The student was instructed to be comfortable and relaxed.

Vajrasan (bolt pose)

In Vajrasan, the student kneels by folding both knees, and then sits on the heels. In this posture, the calf muscles touch the thighs, the heels are close to each other behind the hips and the palms are placed on the respective knees. With the abdomen in, chest out, chin parallel to the ground, the shoulder blades are drawn gently together.

In both these postures an upright position with a straight spine is assumed. These are comfortable asanas, which must assumed without causing undue pain to the legs. Meditation easily undertaken in these asanas help eliminate physiological disturbances from the mind.

Dhanurasan (bow pose)

In Dhanurasan, the subject lies down on the belly. The arms are taken back, the knees bent. The ankles are held with the hands. The breath is inhaled and retained, the body assuming the shape of a bow. The person maintains the posture for ten seconds, exhales slowly and returns to the normal lying down position.

Results

Fig. 2 & 3 indicate values of systolic and diastolic blood pressures in the three postures. In Sukhasan, blood pressure was the lowest 116.4 ± 7.21 / 76.1 ± 7.34. The pressure increased slightly in Vajrasan to 119.5 ± 7.82/ 81.4 ± 6.2. It was the highest recordable in Dhanurasan (125.2 ± 8.23/ 84.8 ± 7.78).

Table 1—Blood pressures in Individual postures

<table>
<thead>
<tr>
<th>S. No.</th>
<th>N</th>
<th>Posture</th>
<th>Blood Pressures ± S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>22</td>
<td>Supine</td>
<td>116 ± 7.89/ 74.6 ± 9.27</td>
</tr>
<tr>
<td>2.</td>
<td>22</td>
<td>Sitting</td>
<td>117.5 ± 8.69/ 76.8 ± 8.52</td>
</tr>
<tr>
<td>3.</td>
<td>22</td>
<td>Standing</td>
<td>112.7 ± 7.97/ 77.0 ± 7.83</td>
</tr>
<tr>
<td>4.</td>
<td>25</td>
<td>Sukhasan</td>
<td>116.4 ± 7.21/ 76.1 ± 7.34</td>
</tr>
<tr>
<td>5.</td>
<td>25</td>
<td>Vajrasan</td>
<td>119.5 ± 7.82/ 81.4 ± 6.2</td>
</tr>
<tr>
<td>6.</td>
<td>25</td>
<td>Dhanurasan</td>
<td>125.2 ± 8.23/ 84.8 ± 7.78</td>
</tr>
</tbody>
</table>

- Paired t test between Sukhasan, Vajrasan and Dhanurasan revealed that change in blood pressures in all three postures was statistically significant (p<0.000 for all values)
- The supine or Shavasan had the lowest blood pressure values with sukhasan being the most comfortable posture for meditation with an erect spine.

Discussion

When the spine is bent while sitting or walking the caved chest squeezes the diaphragm and lungs and prevents the chest from properly expanding and receiving the amount of oxygen necessary to cleanse all the devitalized blood in the lungs. When the lungs and diaphragm do not expand properly, not enough oxygen reaches the blood. Thus toxin laden venous blood in the walls of the alveolar sacs of the lungs remains unpurified and is carried back into the system in this condition.4

When the chest is out and the abdomen in, proper quantity of oxygen is taken in, all the dark venous blood is changed into red blood as a fresh supply of vitality is poured into the system.

Also by sitting upright in a comfortable posture of Sukhasan or Vajrasan the breath slows down and the heart calms down. The breath is controlled and regulated easily. Breath control and relaxation free the mind in the upright posture, enabling it to concentrate on the desired line of thought. Even a posture, when sitting on an armless chair with feet flat on the floor,
Lotus posture (Padmasana)  Accomplished posture (Siddhasana)
Fish posture (Matsyasana)  Bow posture (Dhanurasana)  Cobra posture (Bhujangasana)
Pelvic posture (Supta-Vajrasana)  Peacock posture (Mayurasana)  Locust posture (Shaibhasana)
Head Stand ( Shirshasana)  Shoulder Stand (Sarvangasana)  Plough posture (Halasana)

Fig. 1 Yoga Asanas
Fig. 2 Systolic blood pressures in individual asanas

Fig. 3 Diastolic blood pressures in individual asanas

Fig. 4 Systolic blood pressures in three postures

Fig. 5 Diastolic blood pressures in three postures
is all right provided the spine is erect and the body relaxed.

In *Dhanurasan* the spine is bent and the calf muscles are compressed. The peripheral heart pumps increased blood to the heart. The resulting increase in venous return and cardiac output increase the systolic blood pressure. The *asana* is a stressful pose to the beginner. The sympathetic activity increases as the body assumes the uncomfortable bow shape. Vasconstriction results in a higher recordable diastolic blood pressure. The person who suffers from heart disease, high blood pressure and considerably tender abdominal viscera, excessively enlarged spleen are advised not to practice *Dhanurasan*. However *Dhanurasan* helps improve flexibility of the spine and improves digestive problems.

In our previously conducted study there was a reduction in both systolic and diastolic blood pressure in hypertensive Type 2 diabetes mellitus subjects after two or three weeks of *Yoga* practice. This is associated with significant reduction in drug requirements. The relief from high blood pressure diminishes gradually if meditation is discontinued. The blood pressure was observed to return to normal in patients who restarted the yoga *asana*. This confirms the cause and effect relationship between yoga *asanas* and blood pressure levels.

The cause has been attributed to the improvement of lipid profile and decrease in weight. Yoga has also been observed to decrease heart rate, blood pressure resulting in a gradual shift of autonomic equilibrium to a relative parasympathetic dominance and reduction in sympathetic activity. Two students who did regularly practice yoga had minimal change in blood pressure during different *asanas*. Their values were lower than the calculated mean, showing a shift in parasympathetic balance and a relative control of the autonomic nerves.

The relaxative stretch exercises also result in a relative hypometabolic state and improvement of physical and mental efficiencies. Meditation often helps relax the small vessels that control the blood pressure wall and would help reduce the pressure inside them.

The students felt relaxed and were happy. This may be associated with increased levels of endorphins and enkephalins after yoga. Previous studies have shown that the subjects have showed lower scores in excitability. Changes of heart rate and respiration accompanying a *Yogic* subjective activity is intended to alter the state of mind alone. It has been established that certain yogis can alter the patterns of their cardiovascular functions voluntarily.

*Shavasan* is the *asan* recommended for reducing high blood pressure along with *Pranayama* (left nostril breathing or *Chandranadi Pranayama*) and *Shitkari Pranayama*. *Shavasan* is contraindicated for hypertensives, as the resulting increase in blood flow towards the head proves deleterious to the overfilled heart. By doing *Shavasan* the person relaxes with slow diaphragmatic breathing. The frequency and intensity of both proprioceptive and enteroreceptive impulses is thus reduced. While doing *Shavasan* the person is less conscious of external environment but is alert inwardly. It appears that the yoga exercise influences the hypothalamus through continuous feedback of slow rhythmic proprioceptive and enteroreceptive impulses. This sets the regulatory mechanism in the hypothalamus at a lower level and thereby helps in reduction of blood pressure.

In a study of 112 subjects performing transcendental meditation the mean systolic blood pressure was 13.7 to 24.5 mm Hg lesser than the population mean. The analysis also showed that the meditators with more than five-year experience had a mean systolic blood pressure 7.5 mm Hg lower than meditators with less than five years of experience.

The authors of another study observed that after twelve weeks of transcendental meditation and *Shavasan* the systolic blood pressure fell by 10 mm Hg. The Blood pressure fell by 10mm Hg systolic/ 2mm diastolic after six months and 6 mm systolic/ 2mm diastolic after three months.

A study of individual *asanas* in hypertensives and in chronic yogic trainees needs to be conducted to understand the effects of *asanas* on the autonomic nervous system in normal and abnormal conditions.

The main advantage is that they are easy to perform, have no side effects and requires no equipment. This exercise alone or in combination with weight & salt reduction below 200 mg and antihypertensive medication opens a new horizon in the management hypertension.

**Acknowledgement**

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**References**