Part 1: Concept of Ustrasana according to Yoga and Spiritual Lore.
Part 2: Energy Expenditure During Ustrasana; A Yogic Back Bending Posture

By

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ABSTRACT

Part 1: Concept of Ustrasana according to Yoga and Spiritual Lore.

This literature survey on Uñöräsana was a critical study on Uñöräsana with reference to various Yogic scriptures (ancient and modern) like *Upaniñadas*, Gétä, *Yoga-Sütras* of *Pataïjali* and *Haöha Yoga* texts
like *Haöha Yoga* Pradipīkā, *The Çiva Saàhitä*, *The Gheraëḍa Saàhitä* as well as the books of modern yogis likes B.K.S. Iyengar and Swami Satyananda Saraswati.

The aim of this study was to find out the relation between and the differences among the thoughts of various ancient and modern Yogis on Uñöräsana as well as other äsanas. Also to find out the psyco-physological effect of Uñöräsana on human psychological as well as physical system according to modern and ancient texts.

SUMMARY

The practice of yoga is a precious gift of India to the world. Only recently have we begun to understand its vast potentials and health benefits. However, it has also become fashionable to talk about yoga rather indiscriminately and yoga is assuming a significant commercial potential. Today äsana places most important place in yoga. Because people are more concerned about their health in this modern era and äsanas are beneficial for maintaining general health. It has been proved that after the äsanas the glandular activity is increased and hormonal profile is balanced. There is a decrease in cortisol, growth hormone, and thyroxin (Massion, Teas, Herbert & Kabat, 1995). On the

other hand, prolactin levels increased with no change/ decrease in catecholamine. There may be notable difference in the effect of different types of āsanas and exercises. Sūryanamaskār influences the skeletal muscle with less influence on the vital organs. Yogic practices increase the protein bound iodine (PBI); improve the thyroid and adrenocorticoid functions.

Every symptom that occurs as a result of chronic activation of the stress response can be positively improved through regular practice of yoga. During yoga practice, the stress response turns off during the duration of the session. As a result, the body functions that are altered when we perceive a need to run or fight return to homeostasis. This balanced physiological state allows the body to correct problems that have occurred due to chronic stress.

In this context, it is important to find scientific explanations for the perceived benefits of Yogāsanas. This can also help us to select specific items and individualized therapies. However, much more needs to be done and it is only a matter of time when scientific objectivity will be well-established. Presently, it is well-known that yoga has become internationally accepted.

Part 2: Energy Expenditure During Ustrasana; A Yogic Back Bending Posture

Background: As yoga gets popular, precise measurements of metabolic changes in different yoga postures is being taken up by researchers. Energy expenditure during different types of asanas is available in literature. Studies on energy expenditure during the practice of inverted postures are sparse.
Aim: The aim of this study was to examine the metabolic change during Ustrasana (UST) (camel pose) as compared to Supine Rest (SR).
Methods: The Subjects were 53 healthy (27 males and 26 females) volunteers between 20-35 years of age with a minimum of three months experience in the practice of this asana. Breath by breath recording of oxygen consumption (VO2), carbon dioxide elimination (VCO2), energy expenditure (EE), minute ventilation (VE), respiratory exchange ratio (RER), respiratory rate (RR) and heart rate (HR) were carried out using computerized oxygen Pro system for the entire period of 17 minutes. The sessions were divided into 4 phases (i) pre (5 min). The two sessions (UST, SR) were one day apart. UST is a back bending posture in which the back is bended making the spine concave by the support of the hand with the palm on the heel.

Results: During the practice of UST, the group mean values of VO2 (86.66%) and EE (88.79%) significantly increased compared to pre values and this change was lesser in females compared to male [VO2 (93.18%). EE (94.84%) – males; VO2 (77.78%), EE (80.54%) – females]. And there was no significant reduction in the group mean values of VO2 (14.18%) and EE (80.85%) in females when compared to males VO2 (293.18%) and EE (94.84%0. The group mean values of RR (21.11±4.93) and HR (89.2±29.68) significantly increased during the practice of UST and showed change as a group following UST, however a significant reduction in RR (16.83±4.03) and HR (67.57±8.91) was noted in both male (7.60%, 10.7%) and females (3.47%, 7.55%) after the practice of UST. In the SR session the group means values of (VO2:ph2 – 11.69%), (VO2:ph3-9.51%, (VO2:ph4 – 9.71%) and (EE:ph2 – 11.90%), (EE:ph3 – 10.20%), (EE: ph4-10.43% significantly reduced continuously in all phases.

SUMMARY & CONCLUSIONS

During the practice of UST the VO2 (86.66%) and EE (88.79%) increased followed by VO2 (11.69%), EE (11.90%) reduction in post phase respectively. The control session of supine rest showed continuous reduction. RR & HR increases significantly during UST & not in SR. There was a baseline difference in gender.

The present study has broad implication for the psychologists. Physiologists, and educationalist, therapists as well as doctors. The reductions of metabolic rates and thereby decrease arousal of the sympathetic nervous system activity and reduction of stress symptoms in the practice of this asana, through a light on the relaxation aspect on this asana.

It can be concluded that Yogasanas through practiced with relaxation, may increase muscular effort. Therefore these yogic postures can be used as an aerobic exercises followed by deep rest.

In this study we measured metabolic and respiratory changes during and after the practise of*Uñöräsana*. The conclusions are:

1. During the *Uñöräsana* session oxygen consumption incresed by 86.66%
2. During the *Uñöräsana* session energy expenditure incresed by 88.79%
3. During the *Uñöräsana* session heart rate increased by 15.94%
4. During the *Uñöräsana* session carbon dioxide output increased by

84.80%

5. During the *Uñöräsana* session respiratory exchange ratio increased by 1.20%
6. In post recovery phase oxygen consumprion decreased by 14.18%
7. In post recovery phase energy expenditure decreased by 14.72%
8. In post recovery phase there was a continues reduction in hart rate, carbon dioxide and respiratory exchange ration
9. Respiratory rate and heart rate increased significantly during *Uñöräsana* and not in supine rest
10. There were no significant changes between females and males

These findings suggest that *Uñöräsana* is a mild type of postural exercise and leads to deeper relaxation after its practice.

Key words: Back bending yoga posture, Ustrasana, Oxygen consumption heart rate, Energy expenditure.