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Muscular Analysis of Sun Salutation

Sunil Alphonse^{1*}, Shaheedha A.², Amala Karthiga G.³ and Arunaraj A.¹

¹Govt. College of Physical Education Kozhikode, East Hill, West Hill (PO), Kerala 673007, India

²Faculty of Yogic Science and Therapy, Meenakshi Academy of Higher Education and Research, K. K. Nagar, Chennai 78, India

³Department of Tamil, Meenakshi Academy of Higher Education and Research, K. K. Nagar, Chennai 78, India

*Corresponding Author

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Abstract: Asanas, or poses, from the yoga practise, combined with pranayama, or breathing techniques, make up the Suryanamaskar sequence. The spines of yoga practitioners and the muscles throughout their bodies need to be sufficiently flexible before they can undertake more advanced yoga postures and breathing practises known as pranayama. A series of postures called Suryanamaskar helps practitioners improve their breathing, reduce visceral fat, and promote flexibility in the spine and limbs. It also makes it easier for them to lose weight. The Suryanamaskar practise consists of a sequence of twelve different yoga postures. The whole body is flexed and stretched to its maximum range of motion in this asana that alternates between extending backward and stretching forward. To properly master the method, one first begin by becoming used to each individual position. Once this has been accomplished, the next step is to synchronise one's breathing with the movements being performed. Once this is completed, the respiratory rhythm will be found to fit each posture, and the individual will find that breathing in a different method is uncomfortable.

Keywords: Asanas, Suryanamaskar, Yoga, Muscles, Breathing pattern

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Introduction

Suryanamaskar is a well-designed combination of yoga asanas and breathing exercises. Before attempting advanced yogic postures and breathing techniques known as pranayama, practitioners' spines and body muscles must be sufficiently flexible. Suryanamaskar is a set of postures that decrease visceral fat, increase

flexibility in the spine and limbs, and allow the practitioner to breathe properly.

There are twelve postures in all, each straining different ligaments and moving the spinal column in different ways. The spinal column is bent forward and backward alternately, with profound intake and expiration of air and, in some

circumstances, a little breath retention. When the body is bent forward, the contraction of the abdomen and diaphragm causes the breath to escape. The chest expands and deep breathing happens automatically as the body leans backward. As a result, the body becomes more flexible, and the lungs begin to operate, resulting in proper breathing. Furthermore, the gentle but effective postures increase blood circulation. Simultaneously, the sun's life-giving rays play on man's body, drawing out toxins along with perspiration, revitalising circulation, and imparting life to the human organism that only the sun can provide. The life-giving Suryanamaskar practice makes a person's rigid muscles and spine flexible (Bolgia *et al.*, 2018). After finishing the Suryanamaskar exercise, lie flat as Shavasana (the corpse pose). If the practitioner feels fatigued or queasy after a few rounds, he or she may stop and gradually make progression by increasing rounds while ensuring that the body does not experience discomfort throughout the practice. The number should be raised in accordance with each person's capabilities. Advanced and physically fit practitioners can perform 108 cycles of Suryanamaskar without much difficulty (Saraswathi, 2013).

Suryanamaskar is a series of 12 physical posture. This alternate backward and forward stretching asana flexes and stretches the entire body to full range of motion. The series gives the human body such a profound stretching.

The technique should be learned by first getting comfortable with the postures separately, and then as totality, syncing the breath with the motions should be the next phase. When this is accomplished, the respiratory rhythm will be discovered to match every position, and breathing in alternate way he could unpleasant. Respiration concept is inhalation during backward bending postures due to chest expansion and exhalation during forward bending postures due to torso region compression. Stand with your feet closer or

slightly apart, arms comfortable by your sides, closing the eyes, and become aware of your entire body structure before commencing the practice.

Position 1: Pranamasana (Prayer pose):

Start breathing normally and standing tall, legs together or moderately apart, with hands joining in front of sternum like prayer position or simply standing with your hands in prayer. Consider the following recommendations to improve your position during pranamasana. To minimize instability in the lower back, flex the gluteus muscle minimally while keeping the abdominal wall slightly contracted inwards (Gothe and McAuley, 2016). The transversus abdominis, the epigastric wall's deepest flap muscle, acts on the abdominal conducts the pressure of the diaphragm and transmission abdominis will establish intra-abdominal and intrathoracic pressure and, in the case of pranamasana, keep the pelvis as well as lower back region in the proper position (Table 1).

Position 2: Hasta Utthanasana (Raised arms Pose):

Take both hands upward fingers pointing up. Maintain a shoulder-width separation between your arms. Stretch the entire body by arching the back. Take a breath while raising your arms. Let yourself to calm and go with the posture after experiencing a complete anterior and posterior contraction assuming a tiny curvature through toes to skull as if it were being pulled like just a bow by profound spiritual powers. The action of raising the arms makes balancing a little tricky in this poster. The centre of gravity rises. Tension is caused by striving too hard to press the chest forward, which causes it (Table 2).

Position 3: Padahastanasana (Hand to foot Pose):

From pelvis, lean forward. Bring your both hands by side of each foot and fix the whole palm on the floor and your forehead to your knee. Bend to the front and exhale. This post is the exact opposite posture of hasta utthanasana, from powerful back stretch, we go into a strong download bend by touching the palms to the ground and thus transforming our earthly existence we surrender

Table 1: Table showing muscles, joints, and movements involved in Pranamasana

Body Parts	Muscles Involved	Joints involved	Movements
Calves	Soleus	Tibialis anterior Popliteus	
Thighs	Adductors	Hamstring group	
Trunk	Anterior Abdominal Muscle*	Spinal Muscles Quadratus lumborum	
Scapula	Trapezius Rhomboid	Shoulder joint Elbow joint	Abduction of shoulder Hyperextension of Elbow
Neck	Anterior neck muscle	Posterior neck muscle	
Head	Splenius capitis	Scalenus Medius Scalenus Posterior	
Spine	Transvers spinalis		

Table 2: Table showing muscles, joints, and movements involved in Hasta Uthanasana

Body Parts	Muscles Involved	Joints involved	Movements
Neck	Sternocleidomastoid Scalenus	Atlanto-Axial joint	Flexion of Head
Upper arm and shoulder	Deltoid	Shoulder joint	Flexion of shoulder
Forearm	Triceps brachii		
Wrist	Palmaris Brevis Extensor digitorum communis		Extension of wrist
Posterior	Trapezius Latissimus dorsi Gluteus maximus	Hip joint	Hyper Extension of Hip
Anterior	Serratus anterior		

to and consciously use the force of gravity we surrender to and reach Padahastanasana pose in which the back muscles of the body are stretched significantly as the body comes close to the legs and the hands are put beside the feet or behind the body to extend it even further (Souza and Lima, 2021).). This time, the anterior muscles are passively communicating that the body is inverted (Table 3).

Position 4: Ashwa sanchalanasana (Equestrian Pose):

Take the left leg backward by bending the right leg while holding both hands on each side of the

foot. The right toes are tucked under the knees and are in contact with the floor. Bring your pelvis forward, bend your back, hyper extend the neck by looking back. Keep the fingertip contact with the floor and help to maintain the body without imbalance. Inhale while pushing your chest forward. The main muscles included in this asymmetric poster are those of the lower limbs. Despite the fact that the centre of gravity has been decreased, balance is made more difficult because the base of the stance is narrow and the posture is symmetrical. Placing the hands next to the feet and broadening the base improves balance. The muscles utilised to extend the back

Table 3: Table showing muscles, joints, and movements involved in Pada Hastasana

Body Parts	Muscles Involved	Joints involved	Movements
Trunk	Psoas	Vertebra	Flexion of vertebra
	Iliacus		
Thighs	Hamstring group	Hip joint	Flexion of Hip
	Quadriceps group		
Neck	Sternocleidomastoid	Atlanto-Axial joint	Flexion of Head
	Scalenus		
Posterior	Paravertebral muscles	Vertebra	Flexion of Vertebra
	latissimus dorsi		
	Iliocostalis		
	Cervical spinalis		
	Spinalis capitis		
	Trapezius		
	Teres major		
	Teres minor		
	Infraspinatus		
Arms	Triceps		
Buttocks	Gluteus maximus		
	Gluteus minimus		
Legs	Soleus		

Table 4: Table showing muscles, joints, and movements involved in Aswasanchalanasana

Body Parts	Muscles Involved	Joints involved	Movements
Trunk	Trapezius	Vertebra	Extension of vertebra
		Latissimus dorsi	
Neck	Sternocleidomastoid	Atlanto-Axial joint	Hyper Extension of Head
		Scalenus	
Front leg	Gluteus maximus	Knee joint	Flexion of Knee
	Hamstrings	Ankle joint	Dorsi Flexion
		Quadriceps femoris	
Back leg	Quadriceps femoris	Hip joint	Hyper Extension of Hip
	Hamstrings	Ankle joint	Dorsi Flexion
	Psoas	Knee joint	Slight Flexion of Knee

and head backward are same to those employed in hasta uttanasana, with the key difference being that this pose is more apparent and the arms are lower to the ground. The majority of the stretch in this asana is on the front of the thighs, hips, abdominal muscles, back, and neck (Table 4).

Position 5: Pravatasana (Mountain Pose):

Move the left foot and position it next to right leg. Elevate the hips and simultaneously descend the head between both arms, producing a pyramid with the base. In the final state, do not bend the knees and elbows. Strive to press both heels down to the floor without straining. Try to keep

the head closer to the knee, such that the gazing towards the legs. Exhale while bringing the left leg back. The mountain stance is, as the name implies, a symmetrical stable position. It is a semi-inverted stance in which equilibrium is achieved by widening the base even more by bringing the second foot back. This posture primarily stretches the neck, back muscles, and back of the legs. The arms' muscles are improved since they are engaged in movement (Table 5).

Position 6: Ashtanga Namaskara (Salute with eight parts or points):

Place both knee to the ground, then drop chest

Table 5: Table showing muscles, joints, and movements involved in Parvathasana

Body Parts	Muscles Involved	Joints involved	Movements
Leg	Soleus	Ankle joint	Dorsi Flexion
		Popliteus	
		Achilles' tendon	
Thighs	Hamstring	Hip joint	Flexion of Hip
		Gluteus maximus	
Trunk	Abdominal Muscle*	Vertebra	Flexion of Vertebra
	Longissimus thoracis	Shoulder joint	Flexion of Shoulder joint
		Trapezius	
		Latissimus dorsi	
		Teres major	
		Teres minor	
Neck	Sternocleidomastoid	Atlanto-Axial joint	Flexion of Head
		Scalenus	

Table 6: Table showing muscles, joints, and movements involved in Astanga namaskara

Body Parts	Muscles Involved	Joints involved	Movements
Ankles and toes	Digitorum longus	Ankle joint	Dorsi Flexion
		Hallucis longus	
		Tibialis anterior	
Knees	Hamstring	Knee joint	Flexion of Knee
Thighs	Psoas major	Hip joint	Flexion of Hip
		Iliacus flex	
		Psoas minor	
Neck	Longissimus capitis	Atlanto-Axial joint	Hyper extension of head
Arms	Trapezius	Shoulder joint	Abduction of shoulder
	Rhomboid major	Elbow joint	Hyperextension of Elbow
		Rhomboid minor	

Table 7: Table showing muscles, joints, and movements involved in Bujangasana

Body Parts	Muscles Involved	Joints involved	Movements
Arms	Triceps brachii	Elbow joint	Flexion of Elbow
Trunk	Trapezius	Vertebra	Extension of Vertebra
		Rhomboid	
Hip	Gluteus maximus	Hip joint	Hyper Extension of Hip
		Hamstrings	
Neck	Longissimus capitis	Atlanto-Axial joint	Hyper extension of head

region and jaw on the mat while elevating the buttocks, while the vertebrae is curved. In the position, the breath is held outside.

Strengthens the forearms, shoulders, and legs while developing the chest. It highlights the natural spinal curves and provides more blood to this region, which helps to renew the nerves. In this posture, the back muscles are deeply relaxed.

Even as spinal cord is compressed from top to bottom in this position, the Manipura chakra is activated, and one can sense an enhanced discharge of energy from this centre. As the breath is kept in external holding, the prana goes down to manipura, where that might meet with apana in the experienced practitioner (Table 6).

Position 7: Bhujangasana (Cobra Pose):

Lower your pelvis while propelling your upper body forward and upward with your forearms. Straighten your elbows, arch your back, and press your chest further into the cobra stance. The lower body, from feet to hip should be on the floor, while the hands provide assist to the torso (Mody, 2011). Breathe deeply while lifting. Bhujangasana extends the spine and neck backwards by using the backward bending muscles of the back. The hands and arms are primarily responsible for this action, which forces the relaxed body back into a dynamic curvature. The muscles listed are used to maintain this position (Table 7).

Position 8: Pravatasana (Mountain pose):

Breath out while raising the buttocks and forming a pyramid.

Position 9: Ashwa sanchalanasana (Equestrian pose):

Breath in while assuming the pose, same as position 4 but the legs are inter changed.

Position 10: Padahasthasana (Hand to foot pose):

Breath out while performing the movement, same as position 3.

Position 11: Hasta Utthanasana (Raised arms pose):

This pose is same as position 2. Inhale while raising the torso and arms.

Position 12: Pranamasana (prayer pose):

Exhale while assuming the final position.

Conclusion

Because the base of the stance is small and the posture is symmetrical, maintaining balance is made more difficult, despite the fact that the centre of gravity has been reduced. The hands should be positioned near to the feet, and the base should be widened to promote balance. After one has reached this stage, the following step is to synchronise one's breathing with the motions that are being carried out. As soon as this is finished, the respiratory rhythm that is suited to each position will be discovered, and the person will discover that it is painful to breathe in a different manner after this has been accomplished.

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