

AN ANATOMICAL REVIEW STUDY OF GOMUKHASANA

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ABSTRACT-

Yoga teaches us the knowledge of how to lead a healthy living. It improves our concentration, creativity and sharpens our memory. To maintain a positive physical and mental health. In the middle of hustle and bustle of the modern life, our emotional stability declines day by day. But *yoga* can help to prevent it. So another importance of *yoga* in modern life can be that *yoga* improves our muscle strength, stamina and bring immune and mental stability. *Gomukhasana* is a seated *Yoga* posture that stretches several parts of the body simultaneously, including the ankles, hips, thighs, shoulders, underarms, triceps and chest. Knowledge of anatomy will help to reassure people and guide them towards rehabilitation and a better lifestyle.

Keywords:- Anatomy, *Gomukhasana*, *Yoga*.

INTRODUCTION-

Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. *Yoga* is often depicted metaphorically as a tree and comprises eight aspects, or “limbs:” *Yama*, *Niyama*, *Asana*, *Pranayama*, *Pratyahara*, *Dharana*, *Dhyana*, and *Samadhi*. The word “*Yoga*” comes from the Sanskrit root *yug*, which means “union.” In the spiritual sense, *Yoga* means union of the mind with the divine intelligence of the universe. *Yoga* aims through its practices to liberate a human being from the conflicts of duality, which exists in every living thing, and from the influence of the *Gunas*, the qualities of universal energy that are present in every physical thing. *Yoga* is very beneficial for our health. In the event that we peep into the advantages of *yoga*, they are various. It enhances physical wellness, stretch, controls general prosperity, mental clarity and more noteworthy self-comprehension. The name of this *Asana* comes from the Sanskrit words *Go* meaning “cow”, *Mukha* meaning “face” and the *Asana* meaning “posture” or “seat”. *Gomukhasana* was first described in the *Yoga Yajnavalkya*, none of the *Puranas* make mention of it, and it is next described only in the *Hatha Yoga Pradipika*. It was mentioned with increasing regularity thenceforward.

TECHNIQUE OF GOMUKHASANA

Put the right ankle on its left side beside the buttock. Likewise, put the left ankle on its right side. This is called *Gomukhasana* because it resembles a cow’s face¹.

IMPORTANCE AND USES-

Gomukhasana cures cramps in leg muscles and makes the leg muscles elastic. The chest wall is expanded and back becomes erect ². *Gomukhasana* is an excellent *Asana* for inducing relaxation. It will alleviate tiredness, tension and anxiety. It relieves backache, sciatica, rheumatism and general stiffness in the shoulders and neck.³

NEED OF STUDY

In the contemporary time, everybody has conviction about *Asana* practices towards the preservation, maintenance and promotion of health. But the lacuna of anatomical explanation of structures involved and their role in benefit achieved is still persisting. The knowledge of anatomy will also help the *asana* practitioners, to avoid injuries.

AIMS AND OBJECTIVE

- To generalize a scientific view on the anatomical structures involved in *Gomukhasana*.
- To explore the neuro-musculoskeletal aspects of *Gomukhasana* on the basis of contemporary anatomical knowledge.
- To understand *Gomukhasana* in a scientific way with their anatomical explanation to explore its health benefits.
- To avoid possibilities of injuries while performing *Gomukhasana* by understanding the anatomical structures involved in *Gomukhasana*.

ANATOMICAL ASPECTS OF GOMUKHASANA-

Ankle and foot region

Ankle is plantar flexed and the foot is inverted.

Muscles which produce plantar flexion are gastrocnemius, soleus and it is assisted by the Plantaris, tibialis posterior, flexor hallucis longus and flexor digitorum longus. Feet are inverted by tibialis anterior and posterior.

In *Gomukhasana* the feet are placed by the outer sides of thighs crossing each other at knee joint. The ankle is in plantarflexed position stretching the extensor muscles of anterior compartment of ankle and foot in inverted position stretching the everters of foot. Among these muscles extensor digitorum longus, extensor hallucis longus, tibialis anterior and peroneus tertius belongs to anterior compartment of leg. These muscles are supplied by deep peroneal nerve (L4-S1). Peroneus longus and brevis belong to lateral compartment of leg, which is supplied by superficial peroneal nerve (L5-S2).

Table 1. Muscles stretched at ankle joint in *Gomukhasana*.

Muscle	Location	Nerve supply
Tibialis anterior	Anterior compartment of leg	Deep peroneal nerve (L4-S1)
Extensor digitorum longus	Anterior compartment of leg	Deep peroneal nerve (L4-S1)
Extensor hallucis longus	Anterior compartment of leg	Deep peroneal nerve (L4-S1)
Peroneus tertius	Anterior compartment of leg	Deep peroneal nerve (L4-S1)
Peroneus longus	Lateral Compartment of leg	Superficial peroneal nerve (L5,S1,S2).
Peroneus brevis	Lateral Compartment of leg	Superficial peroneal nerve (L5,S1,S2).

Ligaments

Foot is inverted hence the lateral collateral ligaments are stretched here these includes.

- Anterior talofibular ligaments (ATFL)
- Posterior talofibular ligaments (PTFL)
- Calcaneofibular ligament

Knee Joint

Knee joint is flexed and Leg laterally rotated

The flexion of knee joint is mainly done by semimembranosus, semitendinosus and biceps femoris and it is assisted by the garrilis, popliteus and sartorius. The lateral rotation of leg is done by the biceps femoris.

Compared to other sitting poses *Gomukhasana* is a comfortable *Asana*. The flexion of knee joint is comparatively less and the strain on ligaments is also lesser. Even though both knees are in the same position, the leg at lower level is more flexed and laterally rotated. The extensor compartment or anterior compartment of thigh is stretched when the knee is flexed and the medial rotators of knee and are stretched when it is laterally rotated. Semitendinosus and semimembranosus are a part of hamstring and belong to posterior compartment of thigh.

Table 2. Muscles Stretched at knee joint in *Gomukhasana*.

Muscle	Location	Nerve supply
Vastus medialis	Anterior compartment of thigh	Femoral nerve (L2-L4)
Vastus intermedius	Anterior compartment of thigh	Femoral nerve (L2-L4)

Vastus lateralis	Anterior compartment of thigh	Femoral nerve (L2-L4)
Rectus femoris	Anterior compartment of thigh	Femoral nerve (L2-L4)
Semitendinosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Semimembranosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)

Ligaments of knee joint

Knee joint is flexed and Leg laterally rotated. In this position the maximum pressure is on the following ligaments

- Lateral collateral or fibular collateral ligament. (LCL)
- Anterior collateral ligament (ACL)
- Medial meniscus

Since the knee joint is not at a demanding position there will be less strain on these ligaments.

Pelvis and Hip region

Hip flexion, Lateral rotation and adduction

The flexion of hip joint is done by Psoas major and iliacus and it is assisted by the Pectineus, rectus femoris, and sartorius; adductors (mainly adductor longus). Lateral rotation of hip joint is done by obturators interni, two gemelli and the quadratus femoris and it's assisted by the Piriformis, gluteus maximus and Sartorius. The Adduction of hip joint is done by Adductors longus, brevis and magnus and it is assisted by the Pectineus and gracilis.

Gomukhasana is an easier *Asana* and has less external rotation. The leg at upper level is more flexed at the hip and the lower leg is more externally rotated. The hip is in the position of flexion, adduction and external rotation. Hence the extensors, abductors and the internal rotators are stretched passively. Gluteus maximus is the primary hip extensor supplemented by the hamstrings and adductor magnus. The primary abductors are gluteus medius, gluteus minimus and tensor fasciae latae. Piriformis is stretched because of flexion and adduction as it abduct the flexed thigh.

Table 3. Muscles Stretched at hip joint in *Gomukhasana*.

Muscle	Location	Nerve supply
Gluteus maximus,	Gluteal region	Inferior gluteal nerve (L5-S2)
Gluteus medius,	Gluteal region	Superior gluteal nerve (L4-S1)
Gluteus minimus,	Gluteal region	Superior gluteal nerve (L4-S1)

Piriformis	Gluteal region	Branches from S1 and S2
Tensor fascia lata	Gluteal region	Superior gluteal nerve (L4-S1)
Semitendinosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Semimembranosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Biceps femoris	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Adductor magnus	Medial compartment of thigh	Obturator nerve (12-14) Sciatic nerve (14)

In *Gomukhasana* the hip is flexed, adducted and externally rotated. The primary hip flexors are psoas major and iliacus. These muscles contract to keep the body in position. The adductor compartment is contracted as the hip is adducted especially the adductor longus and brevis muscles.

Table 4. Muscles in contraction at hip joint in *Gomukhasana*.

Muscle	Action in Asana	Nerve Supply
Obturator externus	Lateral rotation of hip	Obturator nerve –L3,4
Obturator internus	Lateral rotation of hip	Nerve to obturator internus –L5,S1
Quadratus femoris	Lateral rotation of hip	Nerve to quadratus femoris –L5,S1
Piriformis	Lateral rotation of hip	Nerve to Piriformis –L5,S1,2
Superior gemellus	Lateral rotation of hip	Nerve to obturator internus –L5,S1
Inferior gemellus	Lateral rotation of hip	Nerve to quadratus femoris –L5,S1
Sartorius	Lateral rotation and flexion of hip and knee flexion	Femoral Nerve –L2,3
Psoas major	Flexion of hip	Ventral rami of the lumbar spinal nerves (L1, L2)
Iliacus	Flexion of hip	Femoral nerve (L2, L3)
Adductor Longus	Adduction of hip	Obturator nerve (L2-L4)
Adductor Magnus	Adduction of hip	Obturator nerve (L2-L4) Sciatic nerve (L4)
Adductor Brevis	Adduction of hip	Obturator nerve (L2-L4)

Pectineus	Adduction of hip	Femoral nerve(L2,L3)
Gracilis	Adduction of hip	Obturator nerve (L2-L4)

The external rotators of hip also are in contraction to maintain the position of *Gomukhasana*. This includes obturator externus, obturator internus, quadratus femoris, piriformis, superior gemellus and inferior gemellus. These muscles are present in the gluteal region. Sartorius muscle helps in the lateral rotation and flexion of hip and also in knee flexion.

The Spine: Thoracic and Lumbar

The lumbar and thoracic spines are erect.

The position of spine in *Gomukhasana* is similar to other sitting *Asana* like *Sidhasana* and *Padmasana*. To maintain an upright shape, the erector spinae, contract to extend the spine, and the psoas major and minor contract to pull the anterior lumbar spine forward. Quadratus lumborum act as synergist to the function of erector spinae.

Table 5. Muscle in contraction at thoracic and lumbar spine in *Gomukhasana*.

Muscle	Location	Nerve supply
Erector spinae	Back	Lateral branches of the Dorsal rami of the cervical, thoracic and lumbar spinal nerves
Quadratus lumborum	Posterior abdominal wall	Ventral rami of the twelfth thoracic and upper three or four lumbar spinal nerves

Cervical Region

Cervical spine erect

In *Gomukhasana* the neck is kept erect like the back hence the extensors of cervical region are contracted to maintain the upright position of the cervical spine. These muscles include the longissimus Capitis, longissimus cervicis, semispinalis capitis, semispinalis cervicis, splenius capitis and splenius cervicis.

Table 6. Muscle in contraction at cervical spine in *Gomukhasana*.

Muscle	Location	Nerve supply
Longissimus Capitis	Cervical	Dorsal primary rami of C3 to C8
Longissimus Cervicis	Cervical	Dorsal primary rami of C4 to C8

Semispinalis Capitis	Cervical	greater occipital nerve (C2) and the third cervical nerve (C3)
Semispinalis cervicis	Cervical	Dorsal primary rami of C3 to C5
Splenius Capitis	Cervical	dorsal rami of C2 and C3
Splenius Cervicis	Cervical	Dorsal primary rami of C5 to C7

The Shoulder region

The shoulders are flexed, adducted and internally rotated.

Flexion is shoulder joint is brought mainly by the clavicular part of the pectoralis major, the anterior fibres of the deltoid, and the coracobrachialis and it's assisted by the coracobrachialis and short head of the biceps. Adduction is mainly done by the pectoralis major and the latissimus dorsi, and it's assisted by teres major, coracobrachialis, short head of biceps brachii, and long head of the triceps brachii. Medial rotation is produced by the pectoralis major, the anterior fibres of the deltoid, the latissimus dorsi, and the teres major.

The upper limb is kept straight and the palms are rested at the knees. The shoulder joint is almost at ease and there isn't much stress at shoulder joint. The position of shoulder joint is in flexion, adduction and internal rotation. But as the hands rests at knees the muscles are relaxed in this position.

Table 7. Muscles Stretched at shoulder joint in Gomukhasana.

Muscle	Location	Nerve supply
Latissimus dorsi	Back	Thoracodorsal nerve (C6-C8)
Teres major	Shoulder	Axillary nerve (C5, C6)

Even though the shoulder is in flexed, adducted and internally rotated, there isn't much deviation from the resting position of shoulder joint. The extensors are slightly stretched in this position. The extensors include the Latissimus dorsi and teres major. Latissimus dorsi is the extensor, adductor and medial rotator of shoulder joint. Teres major is an extensor and also a medial rotator.

Elbow region

Elbow flexed and Forearm pronated

Flexion of elbow joint is done by the brachialis, biceps, and brachioradialis. Pronation of elbow is done by the pronator ters and pronator quardatus.

In *Gomukhasana* the palm rests on the knees. Since the hands are kept over the knee at superior position the elbow is flexed slightly and the forearm is in the pronated position. The forearm is in a relaxed state. Since the hand is fixed at knee and upper limb is in a relaxed position, muscles are not in active contraction to maintain the position.

Wrist and Hand

The palms of the hands are placed over the knees. The wrist and fingers rests on the knees and there is no active contraction of muscles to maintain that position. Muscles moving the wrist and fingers are also not stretched in this position as the joints are in resting position.

Most Stretched Structures in *Gomukhasana*

- Superior extensor retinaculum of leg
- Peroneus tertius
- Peroneus longus
- Peroneus brevis

DISCUSSION-

Basic Joint positions in *Gomukhasana* are the ankles plantar flexed, knees flexed and leg laterally rotated, The hips are flexed, adducted and externally rotated, spine erect, The shoulders are flexed, adducted and internally rotated, the elbows flexed and the forearm pronated.

Gomukhasana cures cramps in leg muscles and makes the leg muscles elastic. Muscle cramp is an involuntarily and forcibly contracted muscle that does not relax. Muscle cramps can occur in any muscle, cramps of the leg muscles and feet are particularly common. Skeletal muscles that cramp the most often are the calves, thighs, and arches of the foot, Muscle Cramps are associated with hypovolemia i.e. cause by dehydration or disturbances of electrolytes such as potassium, sodium, and magnesium. Most muscle cramps can be stopped if the muscle can be stretched.

In *Gomukhasana* there is stretching of anterior and lateral compartment of leg i.e. Tibialis anterior, extensor hallucis longus, extensor digitorum longus and peroneus tertius, peroneus longus and peroneus brevis. Vastus lateralis, vastus medialis, vastus intermedialis, rectus femoris, semimembranosus and semitendinosus are stretched while doing the *Gomukhasana*.

This phenomenon helps in the prevention of muscle cramps.

CONCLUSION-

In *Gomukhasana*, the legs are bending at knees and the feet are kept on the outside of opposite thigh. In *Gomukhasana* the anterior and lateral compartment of leg, the anterior compartment of thigh, the hip flexors, abductors are most stretched in the lower limb. *Gomukhasana* cures cramps in leg muscles. Most muscle

cramps can be stopped if the muscle can be stretched. *Gomukhasana* does not impart much pressure on the ligaments of ankle, knee and hip joints.

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