



"Anatomical Analysis Of *Ustrasana*: Exploring Its Anatomical Benefits, *Chakra* Activation, And Therapeutic Applications

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Abstract

This study presents a comprehensive anatomical analysis of *Ustrasana* and Camel Pose, emphasizing its biomechanics and physiological effects. *Ustrasana* is a significant *Asana* within the framework of *Gheranda Samhita* and is recognized for its ability to promote physical and mental well-being. This study aimed to explore the anatomical structures engaged during the execution of *Ustrasana* and to mitigate injury risks by enhancing our understanding of its biomechanics. Detailed descriptions of the execution of the pose, joint actions, and engaged muscle groups are provided, underscoring the impact of the pose on spinal alignment, flexibility, and strength. Furthermore, *Ustrasana* has been shown to stimulate vital organs, enhance respiratory function, and activate *Chakras*, thereby contributing to overall physical and emotional health. These findings indicate that *Ustrasana* is particularly beneficial for counteracting the effects of modern sedentary lifestyles and musculoskeletal disorders. The research concludes with recommendations for safe practice and modifications for individuals with specific health concerns, highlighting *Ustrasana*'s role in fostering a balanced mind-body connection and promoting holistic health.

KEYWORDS:- Anatomy, Asana, Ayurveda, Ustrasana

Introduction

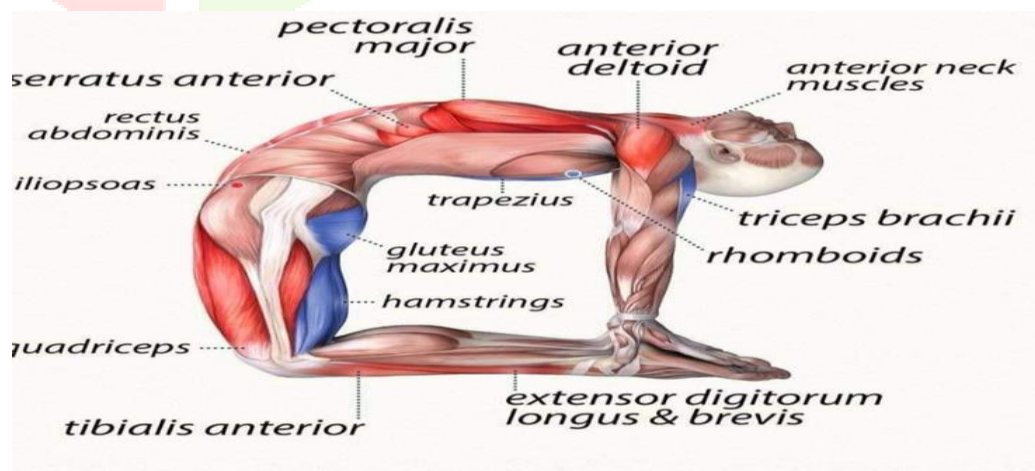
Ayurveda plays a pivotal role in health prevention and management. Various texts elucidate that the principal objective of *Ayurveda* is encapsulated in the phrase “*Swasthasya Swastya Rakshanam, Aturasya Vikara Prashamanam*” [1], signifying the enhancement of well-being and alleviation of illness. *Ayurveda* distinctly addresses the equilibrium between the mind and body. A central component of this discipline is the practice of *Yoga* and *Asanas*. ‘*Yoga*’ - Originating from the Sanskrit term ‘*Yuj*,’ which signifies ‘to unite’ or ‘to harness.’ In the *Sanskrit* lexicon, *yoga* connotes “adduction,” symbolizing the unification of the human soul with the divine. *Yoga* represents the most ancient scientific and ideal discipline in India. This is a systematic approach by which individuals can increase their intrinsic strengths. *Yoga* and *Asanas* exert significant influence on the physiology of critical anatomical structures throughout their execution and stages. *Patanjali Yoga* described eight branches: *Yama*, *Niyama*, *Asana*, *Pranayama*, *Pratyahara*, *Dharna*, *Dhyana*, and *Samadhi*[2]. In *Patanjali's* framework, *Asana* occupies the third position, whereas “*Hatha Yoga*” prioritizes at first position to “*Asana*”, attributing to it the capability to engender both physical and mental contentment. The definition of *Asana* is articulated as “*Sthira Sukham Asanas*’ [3], which translates to a well-balanced and pleasant bodily position. When *Asanas* are performed accurately in a relaxed and conducive environment, the musculature of the body experiences relaxation and these calming impulses are transmitted back to the brain, thereby inducing a state of relaxation[4]. According to the *Gheranda Samhita*, *Shiva* described 8,400,000 *Asanas*[5]. Out of these postures, 84 are considered best, and among those, 32 poses are deemed particularly advantageous for people worldwide. *Ustrasana* is identified as one of the 32 most significant *Asana* in the *Gheranda Samhita*. The term *Ustra* translates into a camel. In *Ustrasana*, a curvature in the back is observed, and the resultant curvature is formed on the anterior aspect of the body, resembling the hump of a camel. *Ustrasana* also signifies the strength of the camel, noted for its proficiency in enduring lengthy periods of severe desert climate. In these texts, *Ustrasana* is commonly linked to the activation of the *Anahata Chakra*. Serving as a representation of the elevation of consciousness and the relationship between physical and spiritual spheres. *Ustrasana*, a backbend pose that challenges gravity, stretches the chest and abdominal muscles, primarily targeting the thoraco-abdominal area. Enhances flexibility and strengthens the spinal column and enhances the strength of the limb and back joints. Engaging in *Ustrasana* promotes improved breathing and circulation, helping restore energy levels. *Ustrasana* affects organs, such as the kidneys, adrenal glands, and pancreas. By boosting resistance to infections, *Ustrasana* contributes to a stronger immune system.

Aims and Objectives

- To explore the anatomical structures involved in “*Ustrasana*.”
- To avoid possibilities of injuries while performing *Ustrasana* by understanding the Anatomical structures involved in “*Ustrasana*.”

Steps for performing *Ustrasana*[6,7]

- Beginning in a kneeling stance. Position your knees so that your thighs are at a right angle to the ground with your hips directly above your knees.
- Establish proper alignment by placing your hands on the hips, with your fingers pointing downwards. Activate the core muscles and direct the tailbone towards the floor.
- Initiate a backward arch by taking a deep breath and elevating the chest towards the ceiling. As you exhale, start to bend backward, attempting to reach your heels with your hands.
- The tailbone was gradually pushed in the direction of the navel, engaging in the pelvic region.
- Now, provide support for your back by resting your hands on your heels or the rear of your pelvis, depending on your level of flexibility. Maintain a neutral neck position or allow it to tilt backwards gently.
- Expand Your Chest: Push your hips forward and broaden your chest, feeling a stretch across the front body.
- Maintain the Position: Remain in *Ustrasana* for 15-30 seconds, breathing steadily. Gradually increasing the duration as flexibility improves.
- Exit Safely: To conclude the pose, return your hands to your hips, lift your chest, and resume a neutral kneeling position.



Joint Actions:

- Spine cervical Extension
- Thoracic Extension;
- Downward scapular rotation and elevation
- Glenohumeral joint external rotation, extension, and adduction.
- Finger and hand flexion of the clasping hands.
- Lumbar deep Extension
- Sacroiliac joint nutations.
- Hip flexion, with pelvis tilted anteriorly,
- Knee extension;
- Ankle dorsiflexion;
- Toe extension;

Discussion**1. Engaged (strengthening) and stretched (opening) muscles in *Ustrasana*****Arms:****Arm Muscles Engaged (strengthening):-**

- Triceps brachii contract when the arms are extended backward to touch the heels.
- Deltoids (Front & Back Portions) work to keep the shoulders steady.
- Biceps brachii Contributes to the maintenance of balance while reaching behind.
- The muscles of the forearm (Flexors & Extensors) aid in holding the heels securely for balance.

Arm Muscles Stretched (Opening):-

- Pectoralis Major & Minor Lengthened as the chest expands.
- Serratus Anterior Stretches because of backward movement of the shoulders.

Muscle	Nerve Supply and Root Value	Function in Ustrasana (Camel Pose)
Biceps Brachii	C5, C6 (Musculocutaneous Nerve)	Assists in stabilizing the arms when placed on the heels, prevents excessive hyperextension of the elbows.
Triceps Brachii	C6, C7, C8 (Radial Nerve)	Supports arm extension when reaching towards the heels, maintains elbow stability.
Brachialis	C5, C6 (Musculocutaneous Nerve)	Helps control elbow movement and maintains stability when bending backward.
Brachioradialis	C5, C6 (Radial Nerve)	Assists in stabilizing the elbow joint.
Deltoid (Anterior & Posterior fibres)	C5, C6 (Axillary Nerve)	Helps stabilize and slightly elevate the shoulders when reaching for the heels
Pectoralis Major	C5-T1 (Medial & Lateral Pectoral Nerves)	Stretches as the chest opens, assists in keeping shoulders stable.
Pectoralis Minor	C8, T1 (Medial Pectoral Nerve)	Stretches and helps in maintaining scapular position
Serratus Anterior	C5, C6, C7 (Long Thoracic Nerve)	Supports scapular movement and stabilization during the backbend.
Latissimus Dorsi	C6, C7, C8 (Thoracodorsal Nerve)	Helps maintain posture and supports arm movement
Flexor Carpi Ulnaris & Radialis	C6, C7, C8 (Median & Ulnar Nerves)	Aids in wrist and forearm stability when gripping the heels.

Spine:

Muscles of the spine Engaged (strengthening):-

- Erector Spinae essential muscle group running along spine that aids in back extension.
- Multifidus has been found to stabilize muscles that maintain spinal alignment.
- Quadratus Lumborum was activated to support the lower back stability.

- Transverse spinalis group (Semispinalis, Rotators, Multifidus) contributes to precise spinal movement and steadiness.

Spinal Muscles Stretched (Opening):-

- Rectus Abdominis Lengthened as the anterior body extended.
- Obliques (Internal & External) extended as the spine curved backward.
- Intercostal muscles elongate as the rib cage expands, facilitating deeper respiration.

Muscle	Root Value (Nerve Supply)	Function in Ustrasana (Camel Pose)
Erector Spinae (Iliocostalis, Longissimus, Spinalis)	C1-S3 (Dorsal Rami of Spinal Nerves)	Extends the spine, maintains the backbend, and provides postural support.
Multifidus	C3-S3 (Dorsal Rami of Spinal Nerves)	Stabilizes the vertebral column, prevents excessive lumbar compression.
Quadratus Lumborum	T12-L4 (Ventral Rami of Lumbar Nerves)	Provides lateral stability and supports lower back extension.
Semispinalis (Capitis, Cervicis, Thoracis)	C1-T12 (Dorsal Rami of Spinal Nerves)	Helps extend the cervical and thoracic spine, supports head positioning.
Rotators	C3-L5 (Dorsal Rami of Spinal Nerves)	Assists in spinal rotation and stabilization during backbend.
Interspinales	C1-L5 (Dorsal Rami of Spinal Nerves)	Supports vertebral alignment and assists in spinal extension.
Intertransversarii	C1-L5 (Dorsal Rami of Spinal Nerves)	Maintains spinal stability and aids in slight lateral flexion.
Latissimus Dorsi	C6, C7, C8 (Thoracodorsal Nerve)	Assists in spinal extension and stabilizes the upper back.

Neck:**Muscles of neck Engaged (Strengthening)**

- Sternocleidomastoid stabilize and regulate the extension of the cervical region.
- Trapezius Provides support to the cranium and aids in the maintenance of proper posture.
- Splenius Capitis & Splenius Cervicis facilitate the backward extension of the cervical spine. Semispinalis Capitis & Cervicis contribute to deeper cervical extension and the stability of posture.

Neck Muscles Stretched (Opening)

- Sternocleidomastoid experiences elongation when the head is positioned posteriorly.
- Scalenes (Anterior, Middle, Posterior) are elongated as the cervical region extends.
- Longus Colli & Longus Capitis represent deep cervical flexors that become elongated during the pose.

Muscle	Root Value (Nerve Supply)	Function in Ustrasana (Camel Pose)
Sternocleidomastoid (SCM)	C2, C3 (Spinal Accessory Nerve - CN XI)	Controls head extension and rotation, prevents excessive backward drop.
Splenius Capitis	C3, C4 (Dorsal Rami of Cervical Nerves)	Supports head extension and slight rotation.
Splenius Cervicis	C4-C8 (Dorsal Rami of Cervical Nerves)	Assists in neck extension and lateral flexion.
Semispinalis Capitis	C1-C5 (Dorsal Rami of Cervical Nerves)	Extends and stabilizes the head.
Longus Capitis	C1-C4 (Ventral Rami of Cervical Nerves)	Stabilizes and controls deep neck flexion, preventing overextension.
Longus Colli	C2-C6 (Ventral Rami of Cervical Nerves)	Maintains neck stability and prevents hyperextension.
Scalene Muscles (Anterior, Middle, Posterior)	C3-C8 (Ventral Rami of Cervical Nerves)	Assist in neck stability and posture control.
Levator Scapulae	C3, C4 (Dorsal Scapular Nerve)	Elevates the scapula, stabilizes neck movement.
Trapezius (Upper)	C3, C4 (Spinal Accessory Nerve -	Supports the head, stabilizes

Fibres)	CN XI)	the shoulders.
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Leg:

Leg Muscles Engaged (Strengthening):-

- Quadriceps (Rectus Femoris, Vastus Lateralis, Vastus Medialis, Vastus Intermedius) function to maintain the activity of the thighs and safeguard the knee joints.
- Hamstrings (Biceps Femoris, Semitendinosus, Semimembranosus) serve to stabilize the pelvis and avert excessive compression in the lumbar region.
- Gluteus Maximus engages to facilitate hip extension and uphold equilibrium.
- Adductors (Inner Thigh Muscles) function to stabilize the lower extremities and prevent lateral deviation.

Leg Muscles Stretched (Opening)

- Hip Flexors (Iliopsoas, Rectus Femoris) are subjected to significant stretching as the hips extend.
- Anterior Tibialis (Shin Muscle) experiences elongation as a result of the foot's positioning in plantar flexion (toes pointed).

Muscle	Root Value (Nerve Supply)	Function in Ustrasana (Camel Pose)
Quadriceps (Rectus Femoris, Vastus Lateralis, Vastus Medialis, Vastus Intermedius)	L2, L3, L4 (Femoral Nerve)	Supports knee stability, prevents excessive bending, and maintains balance in the kneeling position.
Hamstrings (Biceps Femoris, Semitendinosus, Semimembranosus)	L4, L5, S1, S2 (Sciatic Nerve)	Stabilizes the thigh and prevents excessive anterior pelvic tilt.
Gluteus Maximus	L5, S1, S2 (Inferior Gluteal Nerve)	Assists in hip extension and provides support for the pelvis and lower back.
Gluteus Medius & Minimus	L4, L5, S1 (Superior Gluteal Nerve)	Helps stabilize the pelvis and prevent excessive hip movement.
Adductor Group (Adductor Longus,	L2, L3, L4 (Obturator Nerve)	Supports inner thigh activation, preventing outward hip rotation.

Adductor Brevis, Adductor Magnus, Gracilis, Pectineus)		
Iliopsoas (Psoas Major & Iliacus)	L1, L2, L3 (Femoral Nerve)	Stretches deeply allowing for hip extension.
Sartorius	L2, L3 (Femoral Nerve)	Assists in stabilizing the thighs.
Tensor Fasciae Latae (TFL)	L4, L5, S1 (Superior Gluteal Nerve)	Helps in hip stability and slight internal rotation.
Soleus	S1, S2 (Tibial Nerve)	Maintains ankle stability in the kneeling position.
Gastrocnemius	S1, S2 (Tibial Nerve)	Provides ankle and knee stability while kneeling.

Primary Chakras Activated in Ustrasana:

- **Anahata (Heart Chakra)** – The chakra most prominently activated during Ustrasana. Situated at the centre of the thoracic cavity, it regulates love, compassion, and emotional receptivity.
- **Vishuddha (Throat Chakra)** – Located at the cervical region, this chakra is responsible for verbal communication and self-expression. When the head is oriented backward, the throat opens, thereby stimulating this chakra. It plays a crucial role in the articulation of truth and the enhancement of confidence in communicative endeavours.
- **Manipura (Solar Plexus Chakra)** – Positioned at the navel, it governs personal empowerment and self-assurance. The stretching of the abdominal region stimulates this chakra, thereby augmenting inner strength and volition.

Secondary Chakra Activation

- **Ajna (Third Eye Chakra)** – When the gaze is elevated, it may activate intuition and inner discernment.
- **Swadhisthana (Sacral Chakra)** – The opening of the hips may mildly stimulate creativity and emotional fluidity.

Marma point activation in Ustrasana

- **Hridaya Marma (Heart Centre)** Location: At the central thoracic region (Anahata Chakra). The heart-opening stretch enhances blood circulation and facilitates emotional release. Promotes emotional equilibrium, alleviates stress, and fosters love and compassion.
- **Kantha Marma (Throat Region):** Vishuddha Chakra Location: At the cervical region, in proximity to the thyroid and vocal cords. The extension of the neck and the opening of the throat

invigorate energy flow. Enhances communicative abilities, fortifies the thyroid function, and mitigates anxiety.

- **Nabhi Marma (Navel Region):** Location: Around the navel (Manipura Chakra). The stretching of the abdominal area activates the digestive fire (Agni). Enhances digestion, self-confidence, and self-esteem.
- **Kurcha Marma (Hands & Feet):** Palmar surfaces, plantar surfaces, and the bases of the toes. The grounding pressure exerted by the hands and feet enhances stability and energy flow. Improves stability, facilitates detoxification, and enhances circulation.
- **Adhipati Marma (Crown of the Head):** Sahasrara Chakra At the apex of the cranium. When the gaze is oriented upward, it stimulates spiritual consciousness.

Effects on organ in Ustrasana:

- **Heart & Lungs Effect:** The expansion of the thoracic cavity facilitates enhanced oxygen absorption and circulatory efficiency. Fortifies cardiac function, augments pulmonary capacity, and alleviates respiratory conditions such as asthma.
- **Digestive System (Stomach, Liver, Pancreas, Intestines) Effect:** The distension within the abdominal region provides a form of massage that invigorates and activates the digestive organs. Enhances digestive processes and metabolic rate Initiates hepatic detoxification processes Stimulates pancreatic activity, thereby assisting in the regulation of glycaemic levels
- **Kidneys & Adrenal Glands Effect:** The backbend promotes increased perfusion to the renal and adrenal glands. Enhances renal functionality and detoxification capabilities Regulates adrenal hormones, leading to a reduction in stress and fatigue
- **Thyroid & Parathyroid Glands (Neck Region) Effect:** The opening of the throat area stimulates the activity of these glands. Regulates metabolic processes (thyroid functionality) Enhances calcium homeostasis (parathyroid functionality)
- **Reproductive Organs (Uterus, Ovaries, Testes) Effect:** The stretching of the pelvic area augments blood flow to the reproductive glands. Facilitates hormonal equilibrium Enhances fertility and overall reproductive health
- **Brain & Nervous System Effect:** The backbend activates the spinal cord and brainstem. Mitigates stress and anxiety and improves concentration

Anatomical Benefits of Ustrasana (Camel Pose)

- **Spine & Posture Alignment:** Spinal Extension fortifies and enhances flexibility across the thoracic, lumbar, and cervical regions of the spine. Corrects Slouching expands the thoracic cavity, counteracting the adverse effects of suboptimal posture. Enhances Spinal Mobility that improves the natural curvature of the spinal column.

- **Strengthens & Stretches Major Muscle Groups**
- **Organ & Nervous System Benefits:**
 - **Heart & Lungs:** Enhances circulatory dynamics, augments pulmonary capacity, and fortifies the cardiovascular system.
 - **Digestive System:** Stimulates the stomach, liver, and intestines, thereby improving digestive efficiency and metabolic activity.
 - **Hormonal Balance:** Activates the thyroid, parathyroid, and adrenal glands, thereby regulating metabolic and stress responses.
 - **Kidney & Urinary System:** Increases renal blood flow, facilitating detoxification processes.
 - **Nervous System:** Stimulates the parasympathetic nervous system, contributing to stress reduction and enhanced relaxation.
- **Joint & Skeletal Benefits:** Improves Hip & Knee Joint Mobility that strengthens the supporting ligaments of the knee joints. Enhances Shoulder Mobility that increases flexibility within the rotator cuff and scapular regions. Strengthens the Pelvic Region that improves stability of the sacroiliac joint.
- **Circulatory & Energy Flow Benefits:** Boosts Blood Circulation that enhances the delivery of oxygen to both muscular and organ systems. Stimulates Marma Points & Chakras, Activates the Heart, Throat, and Solar Plexus chakras, promoting emotional and energetic equilibrium.

Contraindications:

- **Spinal Issues - Herniated Disc, Severe Scoliosis or Lordosis, Osteoporosis**
Modification: Maintain hands on the lower back rather than attempting to reach for the heels. Avoid excessive compression in the lumbar region—engage the core musculature.
- **Neck & Cervical Spine Problems-Cervical Spondylosis, Weak Neck Muscles**
Modification: Maintain a neutral cervical position instead of fully extending the neck backward. Emphasize thoracic expansion rather than deep cervical flexion.
- **Knee Problems - Meniscus Tear or Ligament Injury, Patellar Issues (e.g., Chondromalacia Patellae)**
Modification: Utilize a rolled blanket beneath the knees for additional support. Avoid excessive anterior pelvic tilt—ensure that thighs remain perpendicular to the ground.
- **Shoulder & Wrist Injuries- Rotator Cuff Injuries, Shoulder Dislocation History, Carpal Tunnel Syndrome**
Modification: Maintain hands on the lower back rather than extending to the heels. Utilize yoga blocks positioned next to the feet to alleviate strain on the shoulders and wrists.
- **Cardiovascular Conditions- Hypertension, Heart Diseases**

Modification: Engage in a gentler adaptation of the pose with hands placed on the lower back. Concentrate on deliberate, controlled respiratory patterns.

- Abdominal & Digestive Disorders: **Hernia, ulcer, pregnancy**

Modification: Avoid deep spinal extension and remain in a moderate backbend. Consider Sphinx Pose or Cobra Pose as alter

- Recent Surgeries: spinal or abdominal surgery, knee Surgery

Conclusion:

In the course of daily activities, individuals predominantly exhibit forward bending and exhibit minimal backward bending. This habitual posture exerts pressure on the internal organs and diaphragm, thereby inducing strain on the internal organs; conversely, backward bending facilitates the stretching of the chest and abdominal musculature, which alleviates pressure on the internal organs and promotes deeper respiration and enhanced circulation. *Ustrasana*, or Camel Pose, serves as a highly beneficial *Asana* for contemporary lifestyles. The prevalence of musculoskeletal disorders is escalating as a result of increasingly busy and demanding lifestyles. The practice of *Yoga* and *Asanas* is exceptionally advantageous in addressing these disorders. The anatomical evaluation of *Ustrasana* (Camel Pose) illustrates that it constitutes an intense backbend necessitating considerable spinal extension, hip flexor elongation, and shoulder mobility. In conclusion, *Ustrasana* represents a formidable backbend that augments spinal flexibility, strengthens the musculature of the back, and enhances posture when executed with appropriate alignment and muscular engagement.

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