

An Anatomical Exploration of “Dhanurasana”

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ABSTRACT

The term *Yoga* is derived from the Sanskrit root *yuj* meaning to bind, join, attach and yoke, to direct and concentrate one's attention on, to use and apply. It also means union or communion. It is the true union of our will with the will of God. *Yoga* is performed through some specific postures called *Asana*. Among the eight limbs of *Yoga*, the yogic technique properly begins at the third limb that is the *Asana*. *Asana* means a state in which one can remain physically and mentally steady, calm, quiet and comfortable. Patanjali defines *Asana* as ‘*Sthirasukhatvam*’ in *Yogasutra* which can be translated as STable and pleasurable state of body is called *Asana*. “*Dhanurasana*” was described as one of the 32 most important *Asana* in *Gheranda Samhita*. The posture is called “*Dhanurasana*” because in this pose the body resembles a bow with its attached string. The trunk and the thighs represent the bow proper and the hands and legs take the place of a string. In *Sanskrit* the word *Dhanush* means a bow. In this article anatomical structures involved in the “*Dhanurasana*” and how this involvement is beneficial in maintaining the health or in management of any disease is explained.

KEYWORDS: *Yoga, Asana, Anatomy, Joint, Muscle, Dhanurasana*

INTRODUCTION

“*Dhanurasana*” was described as one of the 32 important *Asana* in *Gheranda Samhita* (dated 1650 CE). The *Gheranda Samhita* is the most encyclopaedic of the three-classic text about *Asana*. It says that there are 8,400,000 of *Asana* described by *Shiva*. The postures are many in number as there are number of species of living creatures in this universe, among them 84 are the best and among these 84, 32 have been found useful for mankind in this world these 32 *Asana* are mentioned in *Gheranda Samhita*.¹

The “*Dhanurasana*” word comes from the *Sanskrit* word “*Dhanush*” meaning A bow and *Asana* means Posture. Hence, a posture in which the body of practitioner is shaped like a bow with its attached string is called “*Dhanurasana*”.²

Aim of this study- In this article the important expedition of *Asana* practitioner about the anatomical structures involved in the *Asana* and how this involvement is beneficial in maintaining health or in management of any disease and the knowledge of anatomy will also help the *Asana* practitioners, to avoid injuries.

Aim and Objectives -

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

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Material and Methods -

- Texts related to *Yoga-Asana* and their commentaries.
- Other print media, online information, journals, magazines etc.

Review-

According to *Gheranda Samhita*-

प्रसार्य पादौ भुवि दन्डरूपौ करौ च पृष्ठे ध्रतपादयुग्मम् |

कृत्वा धनुष्तुल्यपरिवर्तिता निगध योगी धनुरासन तत || (घेरन्ड संहिता २/१८)

Spreading the legs on the ground, straight like a stick and catching hold of (the toes of) the feet with the hands and making the body bent like a bow, is called by the Yogis the *Dhanurasana* or Bow posture.

According to *Hathयोगpradipika*-

पादाङ्गुष्ठौ तु पाणिभ्यां ग्रहीत्वा श्रवणावधि धनुराकर्षनं कुर्यादधनुरासनमुच्यते || (हठयोगप्रदीपिका 1/27)

According to *Hath Yoga Pradipika*, having caught the toes of the feet with both the hands and carried them to the air by drawing the body like a bow, it becomes *Dhanurasana*.

According to *Swami Vyas dev ji*,

Lie down on your belly and take the arms to the back. Bend the knees and also take the feet to the back. Now hold the ankles with the respective hands and stretch them up so that the toes are turned towards the arms. Inhale, retain the breath and raise yourself up. Stretching the arms and legs assume the shape of a bow. Maintain the position as long as you can. Then exhale slowly and return to the normal position.³

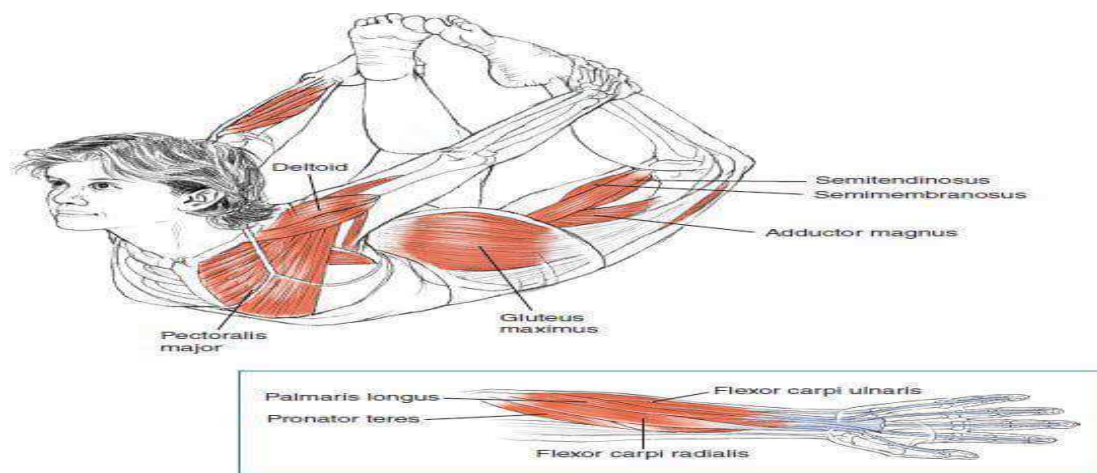
Steps for performing *Dhanurasana*⁴-

- Lie full length on the floor on the stomach, face downwards.
- Exhale and bend the knees. Stretch the arms back and hold the left foot toe with the left hand and the right foot toe with the right hand.
- Now exhale completely and pull the legs up by raising the knees above the floor, and simultaneously lift the

chest off the floor. The arms and hands act like a bow-string to tauten the body like a bent bow.

- Lift up the head and pull it as far back as possible. Do not rest either the ribs or the pelvic bones on the floor. Only the abdomen bears the weight of the body on the floor.
- While raising the legs do not join them at the knees, for then the legs will not be lifted high enough. After the full stretch upwards has been achieved, join together the thighs, the knees and the ankles.

Image-



Anatomical exploration of "*Dhanurasana*"-

Joint actions⁵-

- The hip joints are extended, adducted and medially rotated.
- The knees are flexed.
- The ankles are planter flexed.
- Shoulder joints are extended, adducted and internally rotated.
- The elbows are extended.
- Forearms are pronated.
- The spine is extended.

Muscles and ligaments involved in "*Dhanurasana*"-

Hip region

Hip joints are in extension, adduction and medial rotation in *Dhanurasana*. Hip extension is the backward movement of the thigh. The extension of hip joint is mainly done by gluteus Maximus and semimembranosus, semitendinosus and long head of biceps femoris. Gluteus Maximus is a primary muscle of the hip extensions. So, the flexor of the hip joint will get stretch. The flexors of hip joint are Sartorius, vastus lateralis and vastus medialis and vastus intermedius. The nerve supply of these muscles is femoral nerve. The Adduction of hip joint is done by adductors longus, brevis and magnus and it is assisted by the pectineus and gracilis. During adduction of the hip joint gluteus medius and minimus stretched. The medial rotation of hip joint is done by Tensor fasciae latae and the anterior fibres of the glutei medius and minimus. So, the primary abductors gluteus medius, gluteus minimus and tensor fasciae latae and the lateral rotators of hip joint obturator internus and quadratus femoris are stretched.

Table1. Muscles performing hip extension, adduction and medial rotation in *Dhanurasana*

Muscle	Position	Nerve supply
Gluteus maximus	Gluteal region	Inferior gluteal nerve (L5-S2)
Semitendinosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Semimembranosus	Posterior compartment of thigh	Sciatic nerve (L5-S2)
Long head of biceps femoris	Posterior compartment of thigh	Tibial part of sciatic nerve
Adductor longus	Medial compartment of thigh	Obturator nerve (L2-L4)
Adductor brevis	Medial compartment of thigh	Obturator nerve (L2-L4)
Gracilis	Medial compartment of thigh	Obturator nerve (L2-L4)
Pectineus	Medial compartment of thigh	Femoral nerve (L2, L3)
Tensor fasciae latae	Gluteal region	Superior gluteal nerve (L4-S1)

Table2. Muscles which are stretched at hip joint in *Dhanurasana*

Muscles	Position	Nerve supply
Sartorius	Anterior compartment of thigh	femoral nerve (L2, L3)
Vastus lateralis	Anterior compartment of thigh	femoral nerve (L2, L3)
Vastus medialis	Anterior compartment of thigh	femoral nerve (L2, L3)
Vastus intermedialis	Anterior compartment of thigh	femoral nerve (L2, L3)
Gluteus Medius	Gluteal region	Superior Gluteal nerve (L4, L5, S1)
Gluteus minimus	Gluteal region	Superior Gluteal nerve (L4, L5, S1)
Quadratus femoris	Gluteal region	Superior Gluteal nerve (L4, L5, S1)
Obturator internus	Gluteal region	Superior Gluteal nerve (L4, L5, S1)

Knee region

Knee joint is flexed. The flexion of the knee joint is mainly done by semimembranosus, semitendinosus and biceps femoris and it is assisted by the gracilis, popliteus and sartorius. The extensor compartment or anterior compartment of the thigh will get stretched in *Dhanurasana*. This compartment consists of quadriceps femoris which includes rectus femoris, vastus lateralis, medialis and intermedius.

Table3. Muscles performing flexion of the knee in *Dhanurasana*

Muscle	Position	Nerve supply
Biceps femoris	Back of thigh	Long head by tibial part and short head by common peroneal part of sciatic nerve (L5, S1, S2)
Semimembranosus	Back of thigh	Tibial part of sciatic nerve (L5, S1, S2)
Semitendinosus	Back of thigh	Tibial part of sciatic nerve (L5, S1, S2)

Table4. Muscles which are stretched at knee joint in *Dhanurasana*.

Muscle	Position	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)

Ligaments of knee joint

Knee joint is flexed. In this position the maximum pressure is on the following ligaments.

- Medial and lateral meniscus.
- Posterior cruciate ligament.

Ankle region

The ankle is plantarflexed and the foot is inverted in *Dhanurasana*. Ankle plantar flexion is performed by group of muscles in the posterior compartment of leg and the extrinsic and intrinsic muscles of the toe joint. Gastrocnemius, soleus, tibialis posterior, plantaris, Peroneus longus and brevis. The extrinsic muscles of the toe joint which assist plantar flexion are flexor hallucis longus, and flexor digitorum longus. The intrinsic flexors of toe joints are flexor digitorum brevis, flexor hallucis brevis, quadratus plantae, lumbricals and flexor digiti minimi brevis. The extensor muscles of the anterior compartment of leg are stretched when the ankle is plantarflexed. This includes extensor digitorum longus, extensor hallucis longus, tibialis anterior and peroneus tertius. During the inverted position of the foot evertor muscles of the lateral compartment are stretched. Peroneus longus and brevis belong to lateral compartment of leg. The muscles of dorsum of foot are also stretched. Extensor digitorum brevis and extensor hallucis brevis belongs to the dorsum of foot.

Table5. Muscles performing ankle planter flexion in *Dhanurasana*

Muscle	Position	Nerve supply
Gastrocnemius	Posterior compartment of leg	Tibial nerve (S1, S2)
Soleus	Posterior compartment of leg	Tibial nerve (S1, S2)
Plantaris	Posterior compartment of leg	Tibial nerve (S1, S2)
Tibialis posterior	Posterior compartment of leg	Tibial nerve (L4, L5)
Flexor hallucis longus	Posterior compartment of leg	Tibial nerve (L5, S1, S2)
Flexor digitorum longus	Posterior compartment of leg	Tibial nerve (L5, S1, S2)
Flexor digitorum brevis	Plantar	Medial plantar nerve (S1, S2)
Lumbricals	Plantar	Medial and lateral plantar nerve (S2, S3)
Quadratus plantae	Plantar	Lateral plantar nerve (S1, S2)
Flexor hallucis brevis	Plantar	Medial plantar nerve (S1, S2)
Flexor digiti minimi	Plantar	Lateral plantar nerve (S1, S2)

Table6. Muscles which are stretched at ankle joint in *Dhanurasana*

Muscle	Position	Nerve supply
Tibialis anterior	Anterior compartment of leg	Deep peroneal nerve (L4-S2)
Extensor digitorum longus	Anterior compartment of leg	Deep peroneal nerve (L4-S2)
Extensor hallucis longus	Anterior compartment of leg	Deep peroneal nerve (L4-S2)
Peroneus tertius	Anterior compartment of leg	Deep peroneal nerve (L4-S2)
Peroneus longus	Lateral compartment of leg	Superficial peroneal nerve (L5, S1, S2)
Peroneus brevis	Lateral compartment of leg	Superficial peroneal nerve (L5, S1, S2)
Extensor digitorum brevis	Dorsum of foot	Terminal branches of deep peroneal nerve (S1, S2)
Extensor hallucis brevis	Dorsum of foot	Terminal branches of deep peroneal nerve (S1, S2)

Ligaments of Ankle joint

Ankle is in planter flexion. In this position the maximum pressure is on the following ligaments.

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

Shoulder region

Shoulder joint is extended, adducted and internally rotated in the pose of *Dhanurasana*. Shoulder girdle is depressed. The Extension of shoulder joint is caused by Posterior fibres of deltoid, Latissimus dorsi and assisted by the Teres major, Long head of triceps, Sternocostal head of the pectoralis major. The muscles acting as antagonists for this action are clavicular head of pectoralis major, anterior fibres of deltoid, coracobrachialis and short head of biceps. They are stretched when the shoulder joint is extended. Adduction of shoulder joint is principally done by the Pectoralis major, Latissimus dorsi, Short head of biceps, Long head of triceps, and it is assisted by coracobrachialis and teres major which is antagonised by deltoid and supraspinatus. Medial rotation of shoulder joint is done by the pectoralis major, anterior fibres of deltoid, latissimus dorsi, teres major and subscapularis. The muscles acting as antagonists for this action are infraspinatus, teres minor and posterior fibres of deltoid. Pectoralis minor muscle helps in depression and anterior tilt of scapula and is stretched by the posterior pull of scapula. Deltoid muscle has large range of action on shoulder joint. It helps in the abduction of shoulder joint, the anterior fibers in flexion and posterior fibres in external rotation. Supraspinatus along with deltoid helps in abduction of shoulder joint. Infraspinatus and teres minor are external rotators along with the posterior fibers of deltoid.

Table7. Muscles performing shoulder joint extension, adduction and internal rotation.

Muscle	Position	Nerve supply
Deltoid	Scapular	Axillary nerve(C5-C6)
Latissimus dorsi	Back	Thoracodorsal nerve (C6-C8)
Pectoralis major	Thorax	Medial and lateral pectoral nerve (C5-T1)
Biceps	Anterior compartment of Arm	Musculocutaneous nerve (C5-C7)
Coracobrachialis	Anterior compartment of Arm	Musculocutaneous nerve (C5-C7)
Triceps	Posterior compartment of arm	Radial nerve (C6-C8)
Teres major	shoulder	Lower subscapular nerve (C5, C6)
Subscapularis	shoulder	Upper and lower subscapular nerve (C5, C6)

Table8. Muscles which are stretched at shoulder joint in *Dhanurasana*.

Muscle	Position	Nerve supply
Supraspinatus	Scapular	Suprascapular nerve (C5, C6)
Infraspinatus	Scapular	Suprascapular nerve (C5, C6)
Teres minor	Scapular	Axillary nerve (C5, C6)
Trapezius	Scapular	Accessory nerve
Levator scapulae	Scapular	Dorsal scapular nerve (C4, C5)
Serratus anterior	Scapular	Long thoracic nerve (C5-C7)
Pectoralis minor	Thorax	Medial and lateral pectoral nerve (C5-T1)

Scapula elevation

Elevation of scapula is caused by the Levator scapulae it's also pulled down in this *Asana*. Serratus anterior muscle helps in protraction and upward rotation of scapula. This muscle is stretched by the downward pull of scapula.

Elbow region

Elbow extended and Forearm pronated in *Dhanurasana*. Extension of elbow joint is completed by the triceps brachii and anconeus, and pronation of radioulnar joint is caused by the pronator teres and pronator quadratus. In *Dhanurasana* the upper limb is kept straight and the elbow is extended. The forearm is in pronated position. To maintain the extension of elbow joint the triceps brachii is actively contracted.

Table9. Muscles performing elbow joint extension in *Dhanurasana*.

Muscle	Position	Nerve supply
Triceps brachii	Posterior compartment of arm	Radial nerve (C5-T1)
Anconeus	Posterior compartment of forearm	Radial nerve (C5-T1)

Table10. Muscles which are stretched at elbow joint in *Dhanurasana*.

Muscle	Position	Nerve supply
Brachialis	Anterior compartment of arm	musculocutaneous nerve (C5, C6)
Brachioradialis	Posterior compartment of forearm	Radial nerve (C5-T1)

The Spine

Similarly, to *Bhujangasana* in *Dhanurasana* also the spine is completely extended. All extensors of the back along with external oblique and transverse abdominus are contracted in *Dhanurasana*. These include the erector spinae muscles, transvers spinalis muscles, quadratus lumborum and Levator costarum.

The thoracic and lumbar spines are in extension. The muscles of anterior abdominal wall help in the Extension of trunk. These includes rectus abdominus, external oblique abdominus and internal oblique abdominus.

Table11. Muscles performing spine extension in *Dhanurasana*.

Muscle	Position	Nerve supply
Erector spinae	Back	Lateral branches of the Dorsal rami of the cervical, thoracic and lumbar spinal nerves.
Iliocostalis	Back	Lateral branches of the Dorsal rami of the cervical, thoracic and lumbar spinal nerves.
Longissimus	Back	Lateral branches of the Dorsal rami of the cervical, thoracic and lumbar spinal nerves.
Spinalis	Back	Lateral branches of the Dorsal rami of the cervical, thoracic and lumbar spinal nerves.
Semispinalis	Back	Medial branches of the dorsal rami of the appropriate spinal nerves.
Multifidi	Back	Medial branches of the dorsal rami of the appropriate spinal nerves.
Rotatores	Back	Medial branches of the dorsal rami of the appropriate spinal nerves.
Levator costarum	Back	Dorsal rami C8-T11 (Intercostal nerves)
Quadratus lumborum	Posterior abdominal wall	Ventral rami of the twelfth thoracic and upper three or four lumbar spinal nerves.

Table12. Muscles which are stretched at trunk in *Dhanurasana*.

Muscle	Position	Nerve supply
Rectus abdominis	Anterior abdominal wall	Ventral rami of the lower six or seven thoracic spinal nerves.
External oblique	Anterior abdominal wall	Ventral rami of the lower six thoracic spinal nerves.
Internal oblique	Anterior abdominal wall	Ventral rami of the lower six thoracic and first lumbar spinal nerves.

Cervical region

Cervical spine is extended. In this position the extensors of cervical region are contracted. Trapezius, splenius capitis, splenius cervicis, semispinalis capitis and longissimus Capitis helps to extend the head and are contracted in this case. The suboccipital muscles are Rectus capitis posterior major, Rectus capitis posterior minor, Obliquus capitis inferior and Obliquus capitis superior are involved in extension of the head at the Atlanto-occipital joints and rotation of the head and atlas on the axis. These are also stretched in this *Asana*.

Thoracic spine

It is extended. The superior thoracic vertebrae glide inferior and posterior. Iliocostalis thoracis, Longissimus thoracis, Spinalis thoracis, Multifidus, Semispinalis thoracis are active contracted in *Dhanurasana*.

Lumbar spine

It is extended. Extrinsic back muscles, in the superficial layers Latissimus Dorsi, Levator Scapulae, Rhomboids, trapezius contracts while extension of the lumbar region. Intrinsic muscles help in extension of lumbar spine, Iliocostalis, Longissimus, Spinalis, Semispinalis contracts while performing the *Dhanurasana*. Anterior abdominal wall muscles stretched in *Dhanurasana*.

Wrist and Hand

The hand holds the big toe and the metacarpophalangeal (MCP) and interphalangeal (IP) are flexed to grasp the toe. Primarily flexion of the IP and MCP joints is from the flexor digitorum profundus. The flexor digitorum superficialis assists when increased forces are required. Flexor pollicis brevis and opponens pollicis flex the thumb. Interossei and lumbrical muscles flex the MCP joints. Flexor digitorum superficialis and profundus flex the IP joints of the second through fifth digits. Because the tendons of these muscles pass on the palmar side of the wrist and the MCP joints, they also tend to flex these joints. In using the hand for grasping, flexion of the MCP joints is necessary for the hand to assume the shape of the object grasped or to properly shape the hand for its desired use.

Table13. Muscles performing flexion of wrist and hand in *Dhanurasana*.

Muscle	Position	Nerve supply
Flexor digitorum superficialis	Anterior compartment of forearm	Median nerve
Flexor digitorum profundus	Anterior compartment of forearm	Medial part-ulnar nerve. Lateral part-median nerve (C8, T1)
Flexor pollicis longus	Anterior compartment of forearm	Median nerve (C7, C8)
Flexor pollicis brevis	Hand	Median nerve
Interossei	Hand	Deep branch of ulnar nerve
Lumbricals	Hand	Median nerve and ulnar nerve

Benefits of "*Dhanurasana*"-

It exerts great pressure on spine and stomach and thus strengthens the vertebral bones; spine becomes elastic; releases gas of the stomach; relieves constipation and dyspepsia. Muscles and nerves of shoulders, arms, hands, thighs and feet are benefitted.⁶

In this posture the spine is stretched back. Elderly people do not normally do this, so their spines get rigid. This *Asana* brings back elasticity to the spine and tones the abdominal organs. In my experience, persons suffering from slipped discs have obtained relief by the regular practice of *Dhanurasana* and *Shalabhasana* without being forced to rest or to undergo surgical treatment.⁷

Discussion

The basic joint position in *Dhanurasana* is extension of spine. Extension, medial rotation, adduction of Hip joint, Flexion of knee joint and extension, medial rotation and adduction of shoulder joint. *Dhanurasana* is very important for

stimulating the solar plexus. It regulates the digestive, eliminatory and reproductive organs. While performing the *Dhanurasana* anterior abdominal wall muscles get maximum stretch. The abdominal wall is innervated by intercostal nerves (arising from T6 to T12) and ilioinguinal/iliohypogastric nerves (arising from L1). *Dhanurasana* stimulates the nerves of abdominal wall and affects the sympathetic and parasympathetic functions of organs. It massages the liver and pancreas and thus very useful for yogic management of diabetes. The kidneys are stimulated and the whole alimentary canal is toned. By lying on the diaphragm with the shoulder is extended, the heart is given a gentle massage and, because the thorax is fully expanded in this posture. *Dhanurasana* improves the blood circulation around muscles and tendons and organs but also improves the muscle tone and greater elasticity of ligaments. The blood pressure, heart rate if increased, comes to the normal or remains within normal range without putting extra burden on cardio-respiratory system.

Dhanurasana is useful in the treatment of various chest ailments. It stimulates and regulates the endocrine glands, particularly the thyroid and adrenal glands, and it induces production of cortisone. The extension of spine adjusts the vertebral column, straightening a hunched back and drooping shoulders. It is also recommended for treating certain types of rheumatism. *Dhanurasana* helps to regulate the menstrual cycle and also to correct female infertility, if the cause is not due to deformity of the reproductive organs themselves.

Conclusion

In *Dhanurasana*, having caught the toes of the feet with both the hands and carried them to the air by drawing the body like a bow. In this *Asana* shoulder joint, hip joint is under more stress. The muscles of pectoral region, anterior compartment of arm, anterior abdominal wall and anterior compartment of thigh stretched. The thorax is fully expanded in this posture. *Dhanurasana* improves the blood circulation around muscles and tendons and organs. Stimulates and regulates the endocrine glands, particularly the thyroid and adrenal glands Sacroiliac joint, hip joint and

knee joint limits this posture there are chances of injuries to ligaments in these joints.

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