



## ANATOMICAL STUDY OF KUKUNDAR MARMA.

**Dr. Khan Shazia Islamuddin\***

MD scholar, Department of Rachana Sharir, Uttrakhand Ayurveda University, Rishikul Ayurvedic Campus, Haridwar. Uttrakhand, India. \*Corresponding Author

**Dr. A. N. Pandey**

Professor, Department of Rachana Sharir, Uttrakhand Ayurveda University, Gurukul Ayurvedic College, Haridwar. Uttrakhand, India.

**ABSTRACT** *Kukundar Marma* is one out of 107 *Marma*, located on *Parshava Bhirbhage* (dorso-lateral part of pelvis) and *Pristhvasna Ubhayato* (both side of vertebral column) and is classified as *Vaikalyakara Marma*. Trauma to *Kukundar Marma* results in loss of sensation and paraparesis of lower limb. It is classified as *sandhi marma*, and is closely associated with sacroiliac joint. Most of the *Kukundar Marma Aghatjanya Lakshana* has a resemblance with lumbosacral plexopathy and sciatic nerve injury Here, *marma aghat lakshans* can act as predictors of the structures involved. In this study, scholar was trying to find out exact location of *Kukundar Marma* and its relationship with other anatomical entities (in circumference of this *Marma*) with the help of cadaveric study. As a final result the study concludes that *Kukundar Marma* may be considered as inferior part of sacroiliac joint.

**KEYWORDS :** *Marma, Kukundar, lumbosacral plexopathy.*

## INTRODUCTION

*Marma sharir* is a science of vital anatomical sites which have been established to help the practice of surgery in *Ayurveda*. *Marma* are the conglomeration of *mamsa, sira, snayu, asthi and sandhi*. They are the seats of *parana* and any injury to them leads to major complications, severe pain or death. *Acharya Sushruta* has classified these *marmas* according to the *shadang* distribution for the purpose of easy understanding their locations, like *sakthi gata* (limbs), *vaksha* (thoracic), *udar* (abdominal), *prishtha gata* (back) and *urdhava jatru gata* (above the clavicular level). *Prishthagata marmas* are 14 in number; these are further divided into upper division and lower division by *Acharya Ghanekar Marmas* of upper division are *brihati, amsaphalak and amsa* while lower division contains *katiktarun, kukundar, nitamb and parshvasandhi marmas*. The *Marma* of lower division are located at gluteal region or within the pelvic cavity, which makes them a difficult site to approach. Both gluteal region and pelvis acts as a gateway for the passage of major blood vessels and nerves supplying lower limbs and any trauma may result in permanent debility or major life threatening complications.

*Kukundar Marma* is one of the lower division *marma* which is *Vaikalyakara* in nature (cause deformity on infliction), situated at *Pristha* or back of humans on the outer side of *Jaghana* or pelvic bone, and two in number. Trauma to *Kukundar Marma* causes loss of sensation and paraparesis which is an indicative of nerve involvement. Depending upon the time and extent of the injury disability caused by this *marma* can be permanent. Various authors have assumed the probable anatomical position of *Kukundar Marma* being in between sacroiliac joint and ischial tuberosity. The major nerves related to this area are lumbar and sacral plexus. Most of the *Kukundar Marma Aghatjanya Lakshana* has a resemblance with lumbosacral plexopathy and sciatic nerve injury. Since sciatic nerve is rather large nerve with multiple root values, therefore the *marma* can be located anywhere ranging from its root value up to its extent at ischial tuberosity. Mostly trauma caused by a pelvic fracture or acetabular fracture is the major causes of nerve plexopathy at the given area. Lumbosacral plexopathy accounts for 80% of all nerve injuries after pelvic trauma. Nerve traction sites for the lumbosacral plexus include the dura attachments, connective tissues attachment to the sacral ala and anterior sacroiliac joint. For this reason a detailed anatomic study of sacroiliac joint and associated nerve plexus is done to rule out the location of the *marma* and all the anatomic structures responsible for its *Aghatjanya lakshanas*.

## MATERIALS AND METHODS

The study has been conducted in two parts:

1. Conceptual study- Classical literature, modern literature, books, thesis, journal articles, internet materials were reviewed and related information and references were collected and analysed scientifically to determine the anatomical aspect of *Kukundar marma*.
2. Cadaveric study- A thorough dissection of gluteal region was

carried out on human embalmed cadavers. Each cadaver was placed in prone position with *Gluteus maximus* retracted and dorsal sacroiliac joint was observed.

- For ventral sacroiliac joint cadaver was placed in supine position, and the abdomen was opened with a midline incision. All abdominal and pelvic organs were removed.

All the observations were made at dorsal and ventral sacroiliac joint.

## Observation

### I. Conceptual Study

#### Etymology:

The word *Kukundara* is derived from the word *Kundara* which is prefixed by the word *Ku*. *Ku* means earth and *Kundara* means small depression or pit.

#### Kukundara Word:

- *Sabda- Sagar and Vaman Shivram Apte* have described that *Kukundara* are cavities of loins (the part of the body on both sides of the spine between the lowest ribs and hip bones).

*Acharya Susruta* has described that *Kukundara Marma* are present in the two flanks, on the outer side of the buttocks on the sides of the vertebral column; and injury to this produce loss of sensation and function of the lower part of the body.

*Acharya Gayadas* has interpreted this *marma* to be situated at the lateral part of *jaghana near the nitamb* and are slightly depressed or deep seated; these are *ardhaangula in praman* and *vaikalyakara* in nature.

### Classification of Kukundar Marma according to Acharyas:-

According to Rachana	According to Aghataja --Parinama	According to Pariman
Sandhimarma	Vaikalyakarmarma	Ardhangulpraman

### KUKUNDAR MARMA ACCORDING TO AUTHORS

Dr. Ghanekar	J. N. Mishra	Dr. D. G Thatte	Dr. A. Lele	Dr. R. R. Pathak	Dr. S. K. Joshi
Ischial tuberosity	Slightly below on the lateral flanks of hip	Ischial tuberosity	Posterior superior iliac spine	Sacroiliac joint	Sacroiliac joint

## II. CADAVERIC STUDY

Anatomical observations around sacroiliac joint

### 1. Dorsal portion

Fascia	Superficial and deep lamina of thoracolumbar fascia.
Ligaments	Joint capsule, long dorsal ligament (originates from PSIS), STL & SSL, iliolumbar ligaments.

Muscle	Gluteus maximus(lateral), piriformis(lateral) muscle,Coccygeus(lateral margin of sacrum).
Blood vessels	Superior gluteal artery (below and lateral to inferior margin)
Nerves	Superior and inferior gluteal nerve.

## 2. Ventral portion

Muscle	Psoas major-anterior to joint. Cranial insertion of obturator internus
Ligaments	Superiorly- ilio-lumbar ligaments, anterior sacroiliac ligament (in between ventral surface of the sacral alar and ilium), Caudal border of ventral sacroiliac capsule blends with SSL
Blood vessels	Iliac artery and vein immediately anterior to psoas. major, iliolumbar artery, sacral artery.
Nerves	Branches of lumbar plexus are found after retraction of p. major. Lumbosacral trunk-in between psoas. major and obturator. internus, closely related to ventral Sacroiliac Joint ligament.[fig 1]



**Fig 1. Relation Of Lumbosacral Trunk With Psoas Major Muscle.**

During dissection at sacroiliac joint we found that the dorsal portion of this joint is covered with complex mesh work of ligaments including long and short dorsal sacroiliac ligament and iliolumbar ligament. The lateral part of long dorsal ligament is continuous with the fibres of sacrotuberous ligament.it has been found that the dorsal fascia of the piriformis is continuous with STL. The gluteus maximus is strongly connected and fused with STL and SSL. Only after removing the muscle these ligaments become visible. The superior gluteal artery (sira component) passes posteriorly between the lumbosacral trunk and the first sacral nerve.

## DISCUSSION

Acharyas have said that Kukundar Marma is located on “Pristhvansaubyato” (both sides of the spine), and “Parshvajaghanabhirbhage” (dorso-lateral part of pelvic bone). it is classified under sandhi marma, joint present at the dorsal portion and bilateral to vertebral column is sacroiliac joint. This joint is extended from S1, 2 & 3 sacral segments and is in close association with lumbosacral trunk. The lumbosacral trunk is the closest anatomical structure to the sacrum passing just 0.1 mm off of the anterior surface periosteum. Lumbar part of the lumbosacral trunk is formed by 4th and 5th lumbar vertebral Rami. It traverses across the sacroiliac joint 2 cm below the pelvic brim. Lumbosacral trunk is approximately 30 mm in length. It is main plexus which innervates to lower limb. The L5 nerve root exits inferior to the lumbosacral ligament and is fixed to the anterior superior sacral ala. Lumbosacral trunk is covered throughout its course by the psoas muscle, except at its terminal part near the bony pelvic rim where it is joined by the S1 root. Any trauma to sacroiliac joint (fracture or dislocation) will most likely result in an L5 nerve root injury and affliction of lumbosacral plexus resulting in lumbosacral plexopathy which accounts for 80% of all nerve injuries after pelvic trauma. The lumbosacral trunk gives its branches to sciatic nerve (L4,L5,S1,2,3), superior (L4,5-S1) & inferior gluteal (L5-S1,2) nerves, nerve to obturator internus (L5-S1,2), nerve to quadratus femoris (L4,5-S1). All these structures emerges from pelvic cavity to supply gluteal surface through sciatic foramen, it is a nearly round hollow cavity present at the dorsum of iliac bone. And kukunder word itself means a round cavity or pit, which states that this marma should be located near a round shaped hollow pit. Injury to kukunder marma results in loss of sensation and movement of lower limb. Lesions of

lumbosacral trunk present with foot drop, with variable buttock pain and numbness in the lateral leg and the dorsum of the foot. Neurological findings include not only weakness of ankle and toe dorsiflexion and ankle eversion, but also ankle inversion and toe flexion. There is also variable weakness of the glutei and hamstring muscles. Plantar flexion and ankle jerk usually are normal. Sensory loss is in the L5 dermatomal distribution. Detecting weakness in ankle inversion (tibialis posterior) or toe flexion (flexor digitorum longus), eliminates a peroneal neuropathy.

The sacroiliac joint is a complex joint capable of small amount of movement. It has an auricular or C-shaped, L shaped configuration. It has a short cranial (more fibrous) and longer caudal limb (more synovial). It is present on both side of vertebral column and on dorsal aspect of gluteal region, the most closely situated soft tissue element is lumbosacral trunk, which is in close association with the lower part of the joint. Its trauma and lesions produces same effect as described in kukundar marma aghat lakshans.

Kukundar marma is ardhangul in praman (~ .93 cm ) but the average auricular area of SIJ is ~ 10.7 cm<sup>2</sup> – 14.2 cm<sup>2</sup>, which is far greater than the marma expansion. But Acharya dalhan has said that this marma is slightly *nimma* (deep) in its position, so taking his interpretation in consideration up to the depth of 1cm from inferior point of sacroiliac joint as well as circumference of the area, which is in close association with greater sciatic foramen (a round cavity) was taken in account for the position of kukundar marma.[fig 2] 1 cm circumference covers the ligamentous area of dorsal sacroiliac joint. As the lateral expansion of long dorsal ligament, directly caudal to the PSIS ranges between 15 -30 mm. while a depth of 1 cm corresponds the site where lumbosacral trunk lies and joints with S1 nerve root just below the inferior border of SIJ. The lumbosacral trunk joins the sacral plexus anterior to the piriformis muscle to form the sciatic nerve. So, inferior part of sacroiliac joint (both deep and circumference) might be the site of Kukundar Marma.



**Fig 2 ardhangula parmana of kukundara marma**

## CONCLUSION

The word Kukundara is derived from the word Kundara which is prefixed by the word Ku. Ku means earth Kundara means small depression or pit. Kundara marma is categorized under Sandhi Marma situated on both sides of the vertebral column on the dorso-lateral aspect of pelvic bone. Marma's location and area resembles with dorsal-sacroiliac join. During cadaveric dissection it was found that greater sciatic foramina resemble with a round pit, and most of the important nerves and vessels emerge from this foramen. The superior border of sciatic foramen is continuous with the inferior margin of dorsal sacroiliac joint. Kukundar Marma Aghat Lakshans are Adhokaya Chestanasha (paraparesis) and Sapparshhani (loss of sensation) which can be best observed when neurological structures associated with sacroiliac joint are injured. Therefore, it is concluded that the inferior part of sacroiliac joint may be the position of Kukundar Marma.

## REFERENCES

1. Ayurvedarahasyadipika Susruta Samhita Sharir Sthana Patekmarmaniradesh Shariram 6/34, Hindi Commentary by Dr. Ghanekar B.G., Meharchand Lachhmandas publications New Delhi, 2017:196..
2. Anthony Chiodo, Neurologic injury associated with pelvic Trauma: Radiology and electro diagnosis Evaluation and their Relationships to pain and gait; original article 2007, doi:10.1016/j.apmr.2007.06.004.
3. Shabda Sagar, page no.184
4. Vaman Shivram Aapte The Practical Sanskrit English Dictionary, Printed at Arya Vijyaya, Poona, 1890: 280.
5. Ibidm Sushruta Samhita, Sharir Sthan chapter 6/27,35, p.5
6. <https://www.anatomynext.com/superior-gluteal-artery/>> retrieved on 26/3/2020.
7. <https://www.ncbi.nlm.nih.gov/>anatomic-parameters-for-instrumentation-of-the-sacrum-and-pelvis>: a systematic review of the literature. Retrieved on 6 feb 2020. greys

- <https://www.ncbi.nlm.nih.gov> >anatomic parameters for instrumentation of the sacrum and pelvis: a systematic review of the literature. Retrieved, on 6 Feb 2020.
8. Gregory D. Cramer, Chae- Song Ro, in Clinical Anatomy of the Spine, Spinal cord, and Ans, third edition, 2014
  9. <https://www.ncbi.nlm.nih.gov> >anatomic parametersfor instrumentation of the sacrum and pelvis: a systematic review of the literature. Retrived on 6 feb 2020.
  10. [https:// www.sciencedirect.com](https://www.sciencedirect.com) > <https://doi.org/10.1016/B978-0-323-02899-8.50014-8> >electromyography in clinical practice> a case study approach
  11. Anthony Chiodo, Neurologic injury associated with pelvic trauma: radiology and electro diagnosis evaluation and their relationship to pain and gait outcome, Arch phys med rehab vol 88, September 2007
  13. <https://www.sciencedirect.com>>electromyography in clinical practice > case 5. Retrived on 23/3/2020.
  14. <https://www.ncbi.nlm.nih.gov>>the sacroiliac joint an overview...retrieved on
  15. <https://www.scholar.google.com> > Shashikant dadaso Wadkar et.al Lepa treatment in vishachikitsa wsr to brihatrayees- A review.>Retrived on 3/2/2020.
  16. <https://www.ncbi.nlm.nih.gov>>the sacroiliac joint an overview...retrieved on
  17. <https://www.ncbi.nlm.nih.gov> >anatomic parametersfor instrumentation of the sacrum and pelvis: a systematic review of the literature. Retrived on 6 feb 2020.