ISSN 2581-6217

World Journal of Pharmaceutical Science & Technology

Journal homepage: www.wjpst.com

Review Article

A REVIEW ON ANATOMICAL STRUCTURES OF *KAKSHADHARA MARMA* W.S.R. TO PAINFUL SHOULDER JOINT DISORDERS

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Received: 15-05-2023, Revised: 01-06-2023, Accepted: 30-6-2023

ABSTRACT

Background: *Kakshadhara Marma* is a *Snayu Marma* grouped under *Vaikalyakara* located between *Kaksha* and *Vaksha.* An injury to the *Kakshadhara Marma* results in *Pakshaghata* and *Kunitwam.* Study of *Kakshadhara Marma* in respect to painful conditions of shoulder joint related to detailed location and content is not available. Hence, this study was planned to study the importance of *Kakshadhara Marma* in respect to painful conditions of shoulder joint. **Materials and Methods:** Ayurvedic texts as well as the data bases search engines, journal, related to *Marma* were searched and presented in systematic manner. **Result:** Various painful shoulder joint disorders such as painful shoulder, injury of the scapula, clavicle, sternoclavicular sprains, dislocation, fracture, etc. were discussed. *Kakshadhara Marma* is categorised as *Snayu Marma*, if any type of injury occurs over the *Kaksha Sandhi* then there are maximum chances of ligament injury and main symptoms appears that are pain and paralysis of the arm may be possible. **Conclusion:** *Kakshadhara Marma* can be compared with brachial plexus. Injury may lead to paralysis of upper extremity, considered under *Vaikalyakara Marma*.

Keywords: Injury, *Kakshadhara Marma*, shoulder joint disorders, *Snayu*, *Vaikalyakara*

INTRODUCTION

Acharya Sushruta described a total of 107 *Marmas* and considered *Marmas* as "vital point" in the Human body where the *Mamsa, Sira, Snayu, Asthi* and *Sandhi* along with the *Prana* resides[i]. References related to *Marmas* can be quoted in *Ayurveda* and also appeared in Vedic period and dictionaries. Any direct or indirect injuries / trauma can prove fatal or may result in disability/ pain. Injury to any parts may lead to severe pain, disability, loss of function, loss of sensation (anaesthesia) and death in the individual. To avoid harm, areas should be shielded / protected. From a surgical perspective, critical understanding of *Marma* needed. The *Marma viddha lakshana* explained by *Sushruta,* depending on the nature and degree of the trauma, the human body exhibits a varities of symptoms.

Amongst these 107 *Marma, Kakshadhara Marma* is a *Snayu Marma* according to *Sushruta* whereas to *Vagbhata is a Sira Marma*[ii] grouped under *Vaikalyakara Marma* situated in the *Urdhwa Shakha*[iii] located between *Kaksha* and *Vaksha*[iv]. According to the *Amarkosha* the meaning of the word *Kaksha* is *Bahumoolam*. An injury to the *Kakshadhara Marma* results in *Pakshaghata* and *Kunitwam*[v] in the opinion of *Vagbhata.* Study of *Kakshadhara Marma* in respect to painful conditions of shoulder joint related to detailed location and content is not available. Hence, this study was planned to study the importance of *Kakshadhara Marma* in respect to painful conditions of shoulder joint.

AIMS AND OBJECTIVES

To review the importance of *Kakshadhara Marma* in respect to painful conditions of shoulder joint.

MATERIALS AND METHODS

Ayurvedic texts, Literature of the contemporary science, as well as the data bases Google scholar, PubMed, Medline, AYUSH Research Portal, and Digital Helpline for Ayurveda Research Articles (DHARA), studies available on Research Gate web-based search engines, journal, related to *Marma* were searched and presented in systematic manner.

RESULT

Marma classified as *Mamsa Marma* (muscular vital points), *Sira Marma* (vascular vital point), *Snayu Marma* (ligament vital points) and *Asthi Marma* (vital points of bone) and *Sandhi Marma* (vital point of joints) by *Acharya Sushruta*[vi]. *Marma* are classified according to *Rachana* (structure), *Parinama* (result)[vii], *Pramana* (measurement)[viii], and *Desha* (position)[ix]. *Kakshadhara Marma* is a *Vaikalyakar Marma* on the basis of *Parinama* (result)[x] with predominance of *Soumya mahabhut* by nature[xi].

Kakshadhara Marma is one such vital region in human anatomy which falls under the above classification on the basis of structures involved explained as one among the *Snayu Marma*[xii]. The location of *Kakshadhara Marma* in between *Kaksha* (Axilla) and *Vaksha* (Chest)[xiii]. As per *Rachana Sharir,* the *Kakshadhara* is a *Snayu Marma* of one (1) *Angula pramana16* according to *Sushruta,* and *Sira Marma* according to *Vagbhata*. An injury to the *Marma* point may not necessarily end in death, but it may also induce deformity, long- or

short-term impairment or excruciating agony. *Soumya (jala) Mahabhuta* is the primary component of *Kakshadhara Marma*, is *Vaikalyakara Marma*, according to *Viddha lakshana*. *Akshepaka* (convulsion), *Stambha* (stiffness), excessive *ruja* in *Snayu* (excessive pain in ligaments) and *Vaikalyatha* (deformity) in *anga* are all symptoms of *Snayu Marma viddha lakshan*[xiv].

Kakshadhar Marma is located between *Kaksha* (Axilla) and *Vaksha* (Chest) in the *Samhitas*, This area corresponds to the base of one's arm, which is referred to as *Kaksha Sandhi*. Upper *Hrudaya* (Heart) and below the *Kantha* (Neck) considered as the subclavicular region and the region above the breast. The word *Dhara* means bearing or holding, hence it is named as *Kakshadhara*, assumed that holds the *Kaksha* region with the help of muscles and ligaments, considered as the axillary region where the 2nd part of axillary artery surrounded by the cords of brachial plexus along with axillary vein can be considered (Table 1) (Fig.1 & 2).

Table 1: Details about *Kakshadhara*

Sr. No	**Anatomical details of *Kakshadhara Marma***	
1	Name	*Kakshadhara*
2	Number	02
3	Site	(At Axilla)
4	Type (acc. to *Pramana*)	01 Angula
5	Type (acc. to *Rachana*)	*Snayu*
6	Type (acc. to *Aghataj Parinaam*)	*Vaikalyakara*
7	Structures involved	Subscapularis, Pectoralis minor, Brachial plexus, axillary artery, Axillary vain, Axillary lymph node
8	Signs if injured	*Pakshaghata*

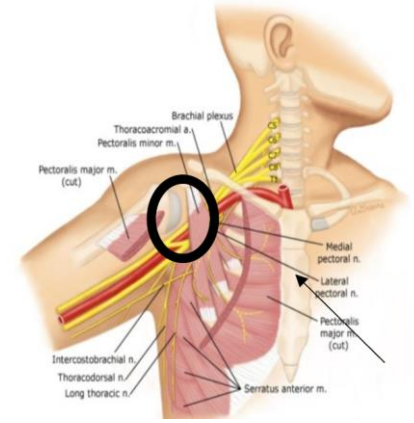

Fig.1: Anatomical details of *Kakshadhara Marma*

Fig.2: Dissection image of *Kakshadhara Marma*

Various painful shoulder joint disorders

Shoulder joint is known the glenohumeral joint, is synovial multiaxial spheroidal joint between the roughly hemispherical head of the humerus and the shallow glenoid fossa of the scapula, an arrangement that permits a very extensive range movement, is safeguarded against displacement by the tendons. The ligaments are not responsible for maintaining the joint surfaces in apposition because the humerus can be separated to an extensive amount from the glenoid cavity; their utility, therefore, is to limit the amount of movement. The joint is protected above by an arch, formed by the coracoid process, the acromion, and the coracoacromial ligament. The articular cartilage on the head of the humerus is thicker at the center than at the circumference, the reverse is the case with the articular cartilage of the glenoid cavity. The acromioclavicular articulation is an arthrodial joint between the acromial end of the clavicle and the medial margin of the scapula is a plane synovial joint.

PAINFUL SHOULDER

Fibrinoid degeneration in and between the collagen fibers, changes to fibrosis, as a result of necrosis and the initial inflammatory reparative process, the local tissues tum alkaline and promote precipitation of calcium salts, may also result in the evasion of an overlying bursa which is a predisposing factor to capsulitis and periarthritis. Lack of joint movement precedes retention of metabolites, edema, venous stasis, and ischemia that results in fibrous adhesions and trigger-point development[xv].

INJURY OF THE SCAPULA

- ✓ Trapezius strains and contusions
- ✓ Fibrositis
- ✓ Postural disorders
- ✓ Scapular fractures

INJURY OF THE CLAVICLE: At the acromioclavicular and sternoclavicular joints, a wide range of injuries and displacement can occur.

- ✓ Distal trapezius contusion
- ✓ Acromioclavicular sprain
- ✓ Acromioclavicular separation

STERNOCLAVICULAR SPRAINS

Sternoclavicular sprains vary from minor to complete dislocation, either posteriorly (retrosternal) or anterior - inferior to overlap the 1st rib. Injury can be graded as follows[14]:

- ✓ Grade 1 injury- sprain and slight tearing of the costoclavicular and stemoclavicular ligament fibers. There is usually no separation. Tenderness is found over and around the articulation.

- ✓ Grade 2 injury- severe subluxation of the clavicle exhibiting partial tear of the costoclavicular and rupture of the sternoclavicular ligaments.
- ✓ Grade 3 injury- dislocation exhibiting complete rupture of the costoclavicular and sternoclavicular ligaments.

THE COSTOCLAVICULAR SYNDROME: The syndrome is due to the neurovascular bundle being compressed between the 1st rib and the clavicle at the point where the brachial plexus joins the subclavian artery and courses over the 1st rib. Symptoms are similar to those of the scalenus anticus syndrome and reproduced by the costoclavicular maneuver[xvi].

COSTOCLAVICULAR MANEUVER: The costoclavicular space by approximating the clavicle the 1st rib, tending to compress the neurovascular structures. An alteration of the radial pulse or reduplication of other symptoms is a probable sign of compression of the neurovascular bundle (costoclavicular syndrome) [14].

STERNOCLAVICULAR DISC INJURY: In some injuries to this joint which are just below the severity of the dislocation, the intra-articular disc may be pulled from its sternal attachment like a semilunar tear of the knee. The patient complain of localized pain in movement. A 'catch may be felt by the patient, especially during ipsilateral shoulder flexion and circumduction. The probability of fracture fragments or osteoporosis must be eliminated before any form of manipulation [14].

DISLOCATIONS

Clavicular dislocations are most often seen in football, soccer, horse racing. Bicycling, gymnastics, wrestling, and accident. Analysis of complications should be made by roentgenography before considered reduction [15].

- ✓ **Acromioclavicular dislocation**
- ✓ **Anterior sternoclavicular dislocation**
- ✓ **Posterior sternoclavicular dislocation**

SHOULDER POINTER: contusion that is caused by a blow from above in the prominent upper deltoid area present at the tip of the shoulder. Acute disability, swelling, and extreme tenderness are the symptoms that are exhibited in the trapezius and/or deltoid. The acromioclavicular joint is not lax and nor is tenderness present in the area of the trapezoid, coracoclavicular, or conoid ligaments [14].

THE BICIPITAL SYNDROME: Forceful contraction of the biceps muscle or forceful movement of the arm with the biceps contracted leads to acute rupture of the bicep's tendon. The injury may be an avulsion of tendon from the muscle belly in any direction along its course or be pulled free from its glenoid attachment. It is usually a debilitating problem in sports and is often accompanied by tenosynovitis. The condition is called golfer's shoulder but may occur in almost any sport [15].

RUPTURE OF THE TRANSVERSE HUMERAL LIGAMENT: The transverse humeral ligament has a crucial function to grip the long head of the helps within its humeral groove. The mechanism of injury is usually due to heavy lifting, Indian arm wrestling, or a slip while carrying a heavy object. The injury occurs, more commonly in young adults, when the contracted biceps face an overload.

ROTATOR CUFF INJURIES: The injury is essentially localized tendinitis from intrinsic overload particularly at the subscapularis insertion on the lesser tuberosity. This results in stability during the process of elevation and external rotation of the arm in the early stages of throwing. The cause is found as the overstretching of the subscapularis at the end of drawback which is instantly interrupted by a sudden force on the tendon. Pain is aggravated in case of resistance to active internal rotation. Tenderness will be found over the lesser tuberosity [14].

DELTOID CONTUSION AND STRAINS: Powerful contraction of the deltoid is one of the main causes of the fracture of its attachment from the clavicle or humerus. Symptoms arise slowly, often is aggravates 6-8 hr after injury. Pain and weakness generally aggravate forward abduction. Evidence of swelling and tenderness appears in the anterior third of the muscle [15].

FRACTURE: Fractures of the proximal humerus are not commonly present in athletics, are common clinically present in mature women with a degree of osteoporosis. About 85% of fractures are simple, usually involving the surgical neck greater tuberosity of the humerus. A scapula fracture may also be associated. In any case within athletics, early mobilization, for not compromising the activities and avoiding the long-term effects, is a necessity.

TENDINITIS AND TENOSYNOVITIS: Tendon inflammation is not as common in the shoulder as it is in the elbow and wrist. Overuse the common cause, both within and outside of sports. The initial inflammatory reparative process is often associated with the deposition of calcium salts which may evade an overlying bursa. Abduction is quite painful against resistance in tendinitis [14].

SUPRASPINATUS TENDINITIS: Inflammation of paratendinous supraspinatus tissues is often associated with subdeltoid or subacromial bursitis, frequently a part of rotator cuff injury and a complication of severe supraspinatus strain [15].

BICIPITAL TENDINITIS: The synovia of the bicipital groove is a common site of chronic peritendinous inflammation, generally occurs as a complication of bicipital rupture (long head) or subluxation of the tendon from the groove.

BURSITIS AND CALCIFICATIONS: The shoulder tendons are wide bands of collagen fibers. Its tensile strength decreases if the application of stress roughens a tendon. This leads to fibrinoid degeneration in and between the collagen fibers and later on results in fibrosis. With the local tissues become alkaline which induces precipitation of calcium salts [14].

SUBDELTOID BURSITIS: Degenerative changes in the rotator cuff (floor of the subdeltoid bursa) results in calcific deposits resulting in acute inflammation of the bursa. The chronic stage is characterized by subdeltoid tenderness, restricted motion in abduction and external rotation, and associated capsular contraction and adhesions, always noted that bursitis is rarely a primary" condition [14].

ROTATOR CUFF CALCIFICATION: An example of calcification in tendons is generally present in the supraspinatus tendon near its insertion to the greater tuberosity of the humerus. Deposits may appear in

shoulder tendons, ligaments, or aponeuroses, and especially within the rotator cuff. They may be chronic, silent, or extremely acute.

SUBACROMIAL BURSITIS: A painful, faltering abduction are is the characteristic feature of subacromial bursitis. An inflamed bursa is exposed to palpation when the arm is relaxed but not when the arm is abducted beyond a right angle (Dawbarn's test) [15].

SUPRASPINATUS CALCIFICATION: Tendon calcification is generally is present in the supraspinatus tendon near its insertion at the greater tuberosity of the humerus. Symptoms occur abruptly. Pain is usually excruciating and aggravated by shoulder movement, but the pain is less severe d movements more tolerated as in supraspinatus tendinitis [15].

OTHER PAINFUL SHOULDER SYNDROMES:

Excessive post-injury immobilization may result in muscle atrophy and loss of capsular elasticity, a predisposing factor to capsulitis and periarthritis. Lack of joint movement results in retention of metabolites, edema, venous stasis, and ischemia leading to fibrous adhesions and trigger-point development.

CAPSULITIS: Shoulder capsulitis is often the result of a sprain accompanied by a spontaneously reduced subluxation or of prolonged overuse. Tenderness and other symptoms are present. Motion limitation may be considerable in adhesive capsulitis (frozen shoulder) where the head of the humerus is glued to the glenoid cavity [14].

FROZEN SHOULDER (PERIARTHRITIS): Periarthritis of the shoulder commonly called frozen shoulder or Duplay's syndrome, a combination of several chronic, diffuse, degenerative shoulder disorders. Loss of scapulohumeral rhythm the characteristic feature [15].

BRACHIAL PLEXUS INJURY: The branches of the brachial plexus of the shoulder lie just anterior to the glenohumeral joint. In trauma to the brachial plexus, the entire plexus or any of its fibers may be injured divided into three general types: total-arm palsies, upper-arm palsies (most common), and lower arm pulsies. Motor involvement is the predominantly occurring feature, sensory loss being obscured by intervening innervation [14].

SCAPULAR WINGIN: Serratus anterior muscle is a purely motor nerve without any sensory fibers, injury to the long thoracic nerve of Bell (C5-7) can result in paralysis of the winding course under the brachial plexus varies considerably in each person thus making localization difficult. Scapular winging is often associated to postural faults, which refer pain to the Shoulder [14].

Hill-Sachs lesion: A Hill-Sachs lesion is a compression fracture or "dent" of the posterosuperolateral humeral head that occurs in association with anterior instability or dislocation of the glenohumeral joint.

DISCUSSION

The classic definition of traumatology is the study of wounds and injuries that occur due to accident or violence to the person and can be correlated with *Marma Vigyanam* that is cites in *Ayurveda* is similar to traumatology as per modern science. The knowledge of *Marma* science bears a very considerable role in *Shalya Tantra* as any injury to the *Marma* point's leads to a perilous effect like death, permanent or temporary disability, and excruciating pain. According to *Acharya* Susrutha, *Parmana* of *Kakshadhara Marma* is one *angula* and is a type of *Vaikalyakar Marma* and *Sanayu Marma.*

The *Marma* are of *Soumya Guna* (attribute) in nature and owing to the *Sthirta* and *Sahitya Guna* of *Soma Mahabhuta,* they can sustain life even after the injury, if these *Marma* points are injured in any case, then may occur *Vaikalyakata* (deformity) of the part of the body and also hampers the functions of the body. If injured *Vaikalyakara Marma* is treated well by a good physician-patient can even recover from the deformity.

Marma is a point where *Mamsa, Sira, Sanayu, Asthi,* and *Sandhi* collate and is the seat where *Prana* by nature resides. *Acharya* Dalhana comments that *Prana* is "*Agnyadaya*" *Acharya* Susrutha specified that *Prana* by nature resides in the *Marma,* in particular, *Acharya* Susrutha mentioned that *Sapta Prana* takes *Ashraya* in *Marma* i.e., *Soma*, *Maruta*, *Tejas*, *Satva*, *Raja, Tama,* and *Bhuthatma*. As a result of injury to the *Marma,* both *Sharir* and *Manas Dosha* get gravated which may destroy both *Sharira* (body) and *Manas* (mind). The *Parana* permeates every cell of the body through the innumerable *Nadis* in which it moves.

The *Angula Parman* of *Ayurvedic* along with the modern measuring techniques is operated to measure the length of the *Marma* site which is mentioned in *Ayurvedic* texts. The dimension of *Kakshadhara Marma* is One *Angula,* which is around 1.95cm, measurement of the *Marma* is therefore determined within two-centimetre circumference and depth. Henceforth, the measurement of this *Marma* is determined within one *Angula* circumference and depth.

The *Kaksha* region refers to root of the arm i.e., the joint which connects the arm to the shoulder known as *Kaksha Sandhi*. *Vaksha* is the region above the *Hrudaya* (Heart) and below the *Kantha* (Neck). It may be considered as the subclavicular region and region above the breast.*Acharya* Sushruta has described the *Kakshadhara Marma Abighaata lakshana* as *Pakshaghaat* and *Kunitam* by *Acharya* Vagbhata. As *Kakshadhara Marma* is categorised as *Snayu Marma,* if any type of injury occurs over the *Kaksha Sandhi* then there are maximum chances of ligament injury and main symptoms appears that are pain and paralysis of the arm may be possible.

Kakshadhara Marma is also categorised as *Vaikalyakara Marma*, suggests that the injury at *Kakshadhara Marma* would be painful and can cause deformity too. Ligament injury is the most common cause of the any joint injury. So ligaments is an important part of any joint as *Snayu* in the formation of any *Sandhi*.

CONCLUSION

Kakshadhara Marma can be compared with brachial plexus. Injury may lead to paralysis of upper extremity, considered under *Vaikalyakara Marma*. *Marma* have abundance of *Snayu* considered under *Snayu Marma* by

the *Acharyas*. The region of axilla where the 2nd part of axillary artery is located can be taken as the location of *Kakshadhara Marma*. Injury to the cords of brachial plexus located in this region leads loss of movements of upper limb which can be considered as *Pakshaghata.*

COMPETING INTEREST

Authors have declared that no competing interest exist.

ACKNOWLEDGEMENTS

The authors are thankful to the Director, Ch. Brahm Prakash Ayurved Charak Sansthan, New Delhi for providing facilities, support and to carry out the research work in the institute.

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