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REVIEW ARTICLE ON ANATOMICAL STUDY OF *JANU SANDHI* AS A *VAIKALYAKAR MARMA* IN *KHANJATA* WITH SPECIAL REFERENCE TO KNEE INJURIES IN KABADDI PLAYERS

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ABSTRACT

Marma are the vital points in the human body & *marmas* are 107 in number. *Marma* are classified into five categories according to *Rachana* that are – *Mans, Sira, Snayu, Asthi, Sandhi marma.* According to *Parinam marma* are classified into - *Sadyapranahara, Kalantarapranahara, Vishalyaghna, Vaikalyakara & Rujakara marma. Vaikalyakara marma* are the points where injury causes structural and functional deformity. In human body total 44 *vaikalyakara marma* are present out of which 12 are present in *Adhoshakha.* They are *Kurcha, Janu, Aani, Urvi, Lohitaksha,* & *vitap. Janu Marma* is considered as a *Sandhi* & *Vaikalyakara Marma*. Injury to *Janu Marma* causes *Khanjata*. *Khanjata* is very much similar to limping of leg, which is commonly seen in people with knee injury. Knee injuries are most commonly seen in Kabaddi players. Kabaddi is the most popular sport in India, in fact in most parts of Asia. Kabaddi is very rough & tough game. Nature of defence & group offence makes Kabaddi players prone to injuries especially the knee injuries. The purpose of the article is to review research on common injuries in kabaddi players, studying anatomy of the knee joint so that coaches & physical education directors can understand biomechanics & can

correct motions of the players & may also develop new effective techniques for better execution of sport motion & in turn preventing injuries.

KEYWORDS: *Marma, Khanjata, Vaikalyakar marma,* Knee injuries, Kabaddi.

INTRODUCTION

Ayurveda is ancient science. In Sanskrit Ayurveda means the science of life or the knowledge of life. It is the branch of science which not only treat the disease but also prolong the life and promote perfect health. Ayurveda has many reference books written in various timeline by various authors. All of these authors have specific aspect over treatment e.g. *Charak Samhita* by *Acharya Charaka* have medicinal aspect whereas *Sushrut Samhita* written by *Acharya Sushrut* have surgical aspect. *Sushrut Samhita* contains various partitions & chapters, out of which the most basic and important is *sharir sthan* in which human body is explained in detail. For understanding the human body various *Acharya* did dissection.

While understanding the human anatomy a unique identification came across are *Marma*s. *Marmas* are the vital points in the body where any type of injury causes minor to major life-threatening conditions.[1] Studying *Marma* gives us knowledge so that if person has trauma on any *Marma*, we can save that person. There are 107 *Marma* in human body.[2] *Acharya Sushrut* have classified *Marma* into 5 categories i.e. *Mansmarma, Siramarma, Snayumarma, Asthimarma, Sandhimarma*.[3] *Acharya Vaghbhat* classified *Marma* into 6 categories out of which 5 are same as *Sushrut* & additional 6^{th} category is *Dhamnimarma*.[4] Depending upon the effect after injury to *Marma* i.e according to *Parinama Marma* are categorized into 5 types *Sadhyapranahara, Kalantarpranahara, Vishalyaghna, **Vaikalyakara**, Rujakara Marma*.[5] Out of these injury to *Vaikalyakara Marma* leads to structural & functional deformities. Total 44 *Vaikalyakara Marma* are present in human body out of which 12 (6pairs) are present in *Adhoshakha* these are -*Kurcha, Janu, Aani, Urvi, Lohitaksha* & *Vitap*.[6] Out of 107 *Marmas Janu Marma* is present in *Adhoshakha* i.e. lower limb which is *Sandhi Marma* according to *Rachana* & *Vaikalyakara Marma* according to *Parinam*.

Janu Sandhi (Knee joint)

According to modern science *Janu Sandhi* can be correlate with knee joint. The knee joint is one of the most complex & largest joints in the body, it is saddle, & bicondylar synovial joint.[7] *Janu Marma* has *Mans, Asthi, Sandhi, Sira*, and *Snayu*.[8] According to modern aspect knee joint involves bones, cartilages, ligaments, synovial membrane, tendons. Its **articular**

surfaces are - condyles of the femur, condyles of the tibia & the patella. **Cartilages** of the knee joint are- meniscus. There are 2 menisci medial and lateral. Knee joint has fibrous capsule which is deficit anteriorly**. Ligaments** of the knee joint are - ligamentum patellae, Anterior cruciate ligament, posterior cruciate ligament, tibial collateral ligament, fibular collateral ligament, oblique popliteal ligament, arcuate popliteal ligament & transverse ligament.[9] **Khanjata –** Injury to *Janu Marma* leads to *khanjata*.[10] *Madhavnidankar* have explained *Khanja* in *Vaatvyadhi*.[11]

Knee injuries in Kabaddi

Injury to knee joint causes limping of leg which can be correlated with *khanjata*. Knee injuries are the most common type of injuries sustained by the raiders & defenders. In raiders sudden turning, twisting movements are required to free him/her from defender & time limit of 30 second for raid also creates pressure on raider. In defenders in order to stop raider defenders have to be in a partially squatting position, then stop or hold on to the raider or rapidly sit & get up. This causes a lot of pressure on knees of the raider & causes knee injuries.[12]

Epidemiology

Sports injuries are becoming more prevalent in many sports all over the world. The most affected sports are Kabaddi, wrestling, football, Rugby etc. Kabaddi is a contact game. Nature of individual defence & group offence of the sport makes players prone to many types of injuries. Kabaddi players are subjected to injuries during competition as well as during training. Wrong technique, overload or mishaps are some of the factors responsible for the injuries. Knee injuries are the most common type of injuries sustain by the raiders & defenders. In raiders due to sudden turning, twisting movements & in defenders due to partially squatting position, rapidly sitting & getting up.[13] The common type of knee injuries in kabaddi are – 1) Dislocation of knee joint & 2) ligament injuries. Exact data regarding dislocation is not available. In case of ligament injuries, the common injuries noted among the players was ACL tear. It was observed that ACL injuries were sustained by 89.47% of the players. Meniscus injuries were sustained by the 68.42% of the players in which medial meniscus injuries were more than lateral. MCL sustained 27.63% injuries.[14]

The science of *Marma* is extraordinary part mention in ayurvedic texts, that has a tremendous value while performing surgery. According to Ayurveda, the knowledge of the location of *Marma* & *Marmabhighat* are important before performing any surgical treatment. With

reference to *Sushrut Samhita Marma* is aggregation of anatomical structures namely *Mansa* (Muscles), *Sira* (Blood vessels), *Snayu* (Ligaments), *Asthi* (Bones) & *Sandhi* (Joints).[15] All these structures are seen in *Janu Sandhi* hence it is a *Marma* point. According to *Sushrut Samhita sharirsthan* 6 - In *Sandhi Marma*, *Mansa* (Muscles), *Sira* (Blood Vessels), *Snayu* (Ligaments) are present in nearly small fraction & *Asthi*, *Sandhi* are present in a highest amount.[16] After the dissection of cadaveric knee joint the same was found which is stated above so we can say that *Janu Marma* is a *Sandhi Marma*. With reference to *Sushrut Samhita Vaikalyakar Marmas* are *Somaguna bhuyishta* which means it has characters like coolness & steadiness.[17] Hence any injuries to these centers or in the vicinity of these areas are highly painful & might lead to irreparable damages.

Janu Marma is *Sandhi Marma* & *Vaikalyakar Marma*. In *Sushrut Samhita* it was stated that an injury to the *Janu Marma* causes *Khanjata*. Initially swelling, restricted joint movements, muscle wasting etc. can be seen which further ends in *Khanjata*. *Khanjata* can be correlated with the limping of leg which may occur due to injury to the knee joint. Knee injuries are quite common in Kabaddi players. It is generally observed that in spite of the best treatment available some deformities still remain as consequences of the injury, so player sacrifice his/her sport career. So, it can be concluded that *Janu* is a *Vaikalyakar Marma*.

Knee joint is designed in such way that it can withstand massive strain in vertical axis. It can absorb 7 times more weight than body weight. But when comes to horizontal force it is not designed to withstand it. Also, Knees are the center of the lever of the leg & sustain greater forces transmitted from the ground as well as from the trunk, so results in injuries.[18]

Anterior Cruciate Ligament (ACL)

ACL injuries have the highest morbidity of knee injuries for Kabaddi players & results in the most time lost. Female players have almost 2 times higher incidence of ACL injuries than Males. Because women have a wider pelvis which causes the downward angle of the thigh bones to be sharper, due to this it causes women to bend their knees towards midline of their body which places additional stress on the ACL. Also, women have much more estrogen than men. This estrogen is responsible for strengthening tendons & ligaments. But fluctuation in its level make women more prone to injury. When there is ACL tear the player usually describes “popping” feeling with sensation of giving way. A clinical diagnosis is made with the help of Lachman & Drawer test. If there is ACL tear then tibia is displaced anteriorly

(Displacement is more than 3mm) during Drawer test. The active patient with ACL deficient Knee is at risk for repeated episodes of instability, meniscal & articular cartilage injury.[19]

- **Attachment**: is attached proximally to the medial wall of the lateral femoral condyle and distally to the tibia, just anterior to the intercondylar eminence of tibia.
- **Function**: It prevents posterior displacement of femur or anterior displacement of tibia & hence prevents hyperextension, limits excessive locking, limits medial rotation of femur when foot is fixed to the ground.[20]
- **ACL injury**: is most commonly found injury in kabaddi player. In fully extended knee ACL is completely taut & in this condition if twisting or lateral external force is applied then ACL gets tear. As compare to PCL, ACL get injured often because ACL is weaker than PCL.[21]

Menisci

- **Attachment:** are crescent shape fibrocartilaginous structures attached on to the periphery of the tibial condyle.
- **Function:** Acts as shock absorbers, deepens the articular surface & in turn provide the stability to the knee joint, contribute to load transmission, cartilage nutrition & joint lubrication.[22]
- **Menisci injury:** there are two menisci- the medial & lateral, out of which medial meniscus is attached to capsule so it is less mobile & fixed, hence more prone to the injuries. An ACL injury can increase the chances for medial meniscus tear. The center of the meniscus has poor blood supply which makes it less amenable to healing. Acute injury to the ligament causes sudden pain & locking of the Knee if unstable. For meniscal tear McMurray's test is performed.[23]

Medial collateral ligament

- **Attachment:** is proximally attached to medial femoral condyle just below the medial epicondyle & distally over the proximal medial tibia under the pes anserinus.
- **Function:** It provides vulgus stability to the knee joint.[24]
- **Medial collateral ligament injury:** MCL & medial meniscus combinedly get injured because of their common attachment on capsule. Isolated MCL injuries are either Grade 1 or Grade 2 depending on their severity & Grade 3 involves the Posterior oblique ligament. MCL & medial meniscus are attached to capsule of knee joint & hence severe injury to MCL is often associated with a significant effusion & may also be associated

with meniscal injury. For medial & lateral collateral ligament Vulgus stress test is performed. In case of MCL tear, there is abnormal medial opening felt by the fingers when placed over the medial joint line & vise a versa in LCL.[25]

Posterior cruciate ligament

- **Attachment:** is proximally attached to the lateral wall of the medial femoral condyle & distally to posterior tibia below the plateau in the midline.
- **Functions:** it prevents the excessive posterior displacement of the Tibia over the Femur or prevents anterior sliding of the Femur especially when Knee is flexed.[26]
- **PCL injury:** Compare to ACL, PCL injuries are very less because PCL is stronger than ACL. The true incidence of posterior cruciate ligament injuries is uncommon. The mechanism of injury is often a direct blow from front of leg or fall onto the Knee causing hyperflexion of the knee. In case of PCL tear if Posterior drawer test is performed normal 1 cm anterior step off between tibia & femur is not felt, further tibia can be pushed backward due to lack of posterior support.[27]

General injury prevention measures for kabaddi

- It's good to use Knee cushions to reduce injuries to the joints.
- Legwork is the most important, so player should at all times be tested for leg strength & agility.
- Playing on an uneven surface contributes for the injuries so the managing authorities should ensure that game should be conducted only on an even surface.
- A pre-seasonal musculoskeletal & medical fitness assessment should be carried out for identifying any existing weakness or injuries.

CONCLUSION

Janu Marma is a *Sandhi* as well as *Vaikalyakar Marma*. Injury to *Janu Marma* ends in *Khanjata*, which can be correlated with limping of the legs due to knee joint injuries. Knee injuries are commonly seen in Kabaddi players. Amongst them ACL injuries are found most commonly, out of which female sustain 2 times more ACL injuries than male. In spite of the best treatment available some deformities still remain as consequences of the injury, so kabaddi player sacrifices his/her sport career. So, it can be concluded that *Janu* is a *Vaikalyakar Marma*. Injury to *Janu Marma* (Knee joint) is major cause of *Khanjata* in Kabaddi player.

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