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Study on the effects of sports induced injuries on Janu sandhi (knee joint) marma - A retrospective observational study

Research Article

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Abstract

In Ayurvedic *samhita*, it is explained that *marma viddha lakshana* are caused due to *aghat (trauma)*. Sports injuries are concerned with traumatic injuries. Comparative study of *marma sharira vigyan* in *shalyatantra* of ayurveda with modern aspects of sports medicine can aware a sportsmen about the injuries. *Janu sandhi* (knee joint) is the mostly used joint in various sports leading to a wide range of injuries. The aim of this study was to evaluate sports injuries especially in *Janusandhi Marma* and structural damage occurring in it. The *viddh lakshannas*(traumatic injuries) of *Janu Marma* are limping *(Khanjata*) and the objective of this study is to determine the specific injury at the knee joint that might cause limping. Total 30 patients were selected as per the inclusion and exclusion criteria mention in proforma. Observation & Results were noted with the help of Objective criteria mentioned in the proforma which included sports wise distribution, types of injury, mode of trauma, structural deformities clinical examination score and final diagnosis in study group. The result was Maximum patients had Medial Collateral Ligament involvement followed by Anterior Cruciate Ligament & Medial Meniscus injuries. Patellar injuries and Lateral Collateral Ligament injuries were comparatively less. So it was concluded that with the assessment of clinical examination score it is possible to judge the severity of trauma to *janu sandhi marma* and the structures involved in the traumatic injuries amongst sports athletes. This study can be helpful for deciding the treatment regime of the patient.

Key Words: *Khanjata,* Knee joint injury*, Marma viddha lakshan, Sports injuries.*

Introduction

In Ayurvedic *samhita*, it is explained that *marma viddha lakshana* are caused due to *aghat* (trauma) (1). Sports injuries are concerned with traumatic injuries. This research is going to concentrate especially on traumatic sports injuries. Comparative study of *marma sharira vigyan* in *shalyatantra* of ayurveda with modern aspects of sports medicine can aware a sportsmen about the injuries.So this work is carried with reference to traumatic injuries in sports medicine in context with modern medicine with the help of modern investigation, co-relating it with Ayurvedic point of view. This would be the contribution from this research & science of Ayurveda in the new era of sports medicine.

In the case of *sandhi marma* damage, the site of injury feels like it's full of thorns, and even after the wound heals, there is shortening of the arm, lameness, reduction in strength and mobility, emaciation of the body, and swelling of the joints (2).

Janu marma is situated in the lower extremity (3). It is located at the point where the femur and tibia bones come together. It has three *anguli parinama* and is dominated by *sandhi* (4). These are two in number and *vaikalyakara* in *parinama* (5). Trauma to this marma results in deformities and may even result in functional loss (6). A *janu marma* injury or piercing at the thigh-knee junction renders the patient lame (7).The knee joint is correlated with *Janu marma*.

Aims and Objectives

- To study *Janu marma* according to Ayurveda
- To study various sports injuries especially in *Janu Marma*
- To study structural damage due to sport injuries in *Janu sandhi Marma*

Materials and Methods

Materials

- Literary Research-Literary review from various Ayurvedic texts.

  Literary review of knee joint from modern texts
- Clinical study

  Study design total 30 patients of various sports were selected irrespective of age, gender and religion.

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Inclusion criteria

- Sports person having traumatic injuries on knee joint leading to limping & having functional disability of age 20 to 40 years were selected for the study.

Exclusion criteria

- Pathological disorder
- Chronic traumatic injury
- Congenital disorders

Methods

Informed consent

The subject undergoing this study were informed about the nature of the study &written consent for each subjects in all group was taken.

Study evaluation

- Age, gender, weight, height & address were noted of each patient.
- Past history of any pre-existing disease or trauma were noted.
- Mode of trauma either direct or indirect (twisting) were noted.
- All clinical examinations were noted.

Observations and Results

Total 30 patients were registered in this study. All 30 patients were registered with through clinical examinations, tests & investigations were noted. The observations were recorded & necessary charts & graphs were made.

All the observations along with proper statistical method were noted. After this, a discussion of the results was done & proper conclusion on the basis of observations of all findings was carried out.

Table 1: Sports wise distribution of cases in study group

Sports	No. of cases	Percentage
Basketball	3	10
Cricket	4	13.33
Football	6	20
Hockey	2	6.67
Kabaddi	4	13.33
Kho-kho	3	10
Long jump	2	6.67
Running	2	6.67
Tennis	2	6.67
Volleyball	2	6.67
Total	30	100

Above mentioned sports were selected for the study. Maximum no. of patients were from Football i.e 6 (20%) followed by Cricket & Kabaddi including 4 patients (13.33%) of each. 3 patients (10%) were each of Basketball & Kho-Kh0. 2 patients (6.67%) each of Hockey, Long jump, Running, Tennis & Volleyball respectively.

Table 2: Type of injury wise distribution of cases in study group

Types of injury	No. of cases	Percentage
Dislocation	1	3.33
Fracture	2	6.67
Ligament sprain	5	16.67
Ligament tear	10	33.33
Ligament + Meniscus tear	6	20
Meniscus tear	4	13.33
O'donoghoe's triad	2	6.67
Total	30	100

Out of total 30 patients, maximum number of patients were of ligament tear i.e 10 (33.33%) & minimum no. of patients of dislocation i.e 1 (3.33%). 6 Patients (20%) of ligaments + meniscus tear , 5 Patients (16.67%) of ligament sprain, 4 patients (13.33%) of meniscus tear & 2 patients (6.67%) each of fracture & O'donoghoes triad.

Table 3: Clinical examination score and mode of trauma in study group

Clinical examination score	Mode of trauma			Total (%)
	Direct (%)	Twist (%)	Both (%)	
Mild (<9)	0 (0)	5 (16.67)	0 (0)	5 (16.67)
Moderate (9-10)	2 (6.67)	13 (43.33)	2 (6.67)	17 (56.67)
Severe(>11)	4 (13.33)	2 (6.67)	2 (6.67)	8 (26.67)
Total	6 (20)	4 (66.67)	4 (13.33)	30 (100)

There is significance association between clinical examinations of *janu marma* in sports injuries.

Total 17 patients (56.67%) had moderate type of injury by clinical examinations including 13 patients (43.33%) of indirect trauma (twist), & 2 patients (6.67%) each of direct trauma & both (DT + IDT). 8 patients (26.67%) were of severe type of injury with 4 patients (13.33%) of direct trauma, 2 patients (6.67%) each of IDT & both. Only 5 patients (16.67%) had mild type of injury with IDT by clinical examinations.

Table 4: Structural deformities and mode of trauma in study group

Structural deformities	Mode of trauma		Total (%)
	Direct (%)	IDT (Twist) (%)	
ACL	4 (7.55)	11 (20.75)	15 (28.30)
MM	2 (3.77)	11 (20.75)	13 (24.53)
LCL	1 (1.89)	11 (1.88)	2 (3.77)
MCL	6 (11.32)	14 (26.42)	20 (37.74)
Patella	3 (5.66)	0 (0)	3 (5.66)
Total	16 (30.19)	37 (69.81)	53 (100)

There is significant association between structural deformities of *janu marma* in sports injury.

Out of 30 patients, maximum no. of patients had Medial Collateral Ligament (MCL) involved in the injury i.e 20 (37.74%) with 6 (11.32%) patients of Direct trauma (DT) & 14 (26.42%) of indirect trauma IDT (Twist). Minimum patients had Lateral Collateral

Ligament (LCL) injury 1 patient (1.89%) of DT & 1 of (1.88%) IDT, total 2 patients (3.37%). 15 patients (28.30%) had Anterior cruciate ligament (ACL) injuries with 4 (7.55%) patients of DT & 11 (20.75%) patients of IDT. 13 Patients (24.53%) had Medial meniscus (MM) injuries, out of which 2 (3.77%) had DT & 11 (20.75%) had IDT. Only 3 Patients (5.66%) were having patellar injury with DT.

Table 5: Structural deformities of janu marma in sports injuries in study group

Structural deformities Final diagnosis	ACL	MM	LCL	MCL	Patella	Total
Complete ACL Tear	1	-	-	-	-	1
Complete MCL Tear	-	-	-	1	-	1
Complete MCL + ACL Tear	1	-	-	1	-	2
Complete MCL + ACL + MM Tear	2	2	-	2	-	6
Complete MCL + Partial MM Tear	-	1	-	1	-	2
Complete MM Tear	-	1	-	-	-	1
LCL Sprain	-	-	1	-	-	1
MCL Sprain	-	-	-	2	-	2
MCL + ACL Sprain	2	-	-	2	-	4
Partial ACL Sprain	2	-	-	-	-	2
Partial ACL + MM Tear	2	2	-	-	-	4
Partial LCL Tear	-	-	1	-	-	1
Partial MCL Tear	-	-	-	2	-	2
Partial MCL + ACL Tear	2	-	-	2	-	4
Partial MCL + Complete MM Tear	-	1	-	1	-	2
Partial MCL + MM Tear	-	2	-	2	-	4
Partial MM Tear	-	3	-	-	-	3
Patellar Dislocation	-	-	-	-	1	1
Patellar Fracture	-	-	-	-	2	2
Total	12	12	2	16	3	45

Maximum patient's 16 had their MCL involved in final diagnosis, followed by 12 patients each with ACL & MM injuries. 3 Patients had patellar injury & 2 patients had LCL injury.

Table 6: Clinical examination score and final diagnosis in study group

Final diagnosis	Clinical examination score			Total
	Mild (<9)	Moderate (9-11)	Severe (>11)	
Complete ACL Tear	0	0	1	1
Complete MCL Tear	0	0	1	1
Complete MCL + ACL Tear	0	0	1	1
Complete MCL + ACL + MM Tear	0	0	2	2
Complete MCL + Partial MM Tear	0	0	1	1
Complete MM Tear	0	1	0	1
LCL Sprain	0	1	0	1
MCL Sprain	1	1	0	2
MCL + ACL Sprain	1	1	0	2
Partial ACL Sprain	1	1	0	2
Partial ACL + MM Tear	0	2	0	2
Partial LCL Tear	1	0	0	1
Partial MCL Tear	1	1	0	2
Partial MCL + ACL Tear	0	2	0	2
Partial MCL + Complete MM Tear	0	1	0	1
Partial MCL + MM Tear	0	2	0	2
Partial MM Tear	0	3	0	3
Patellar Dislocation	0	1	0	1
Patellar Fracture	0	0	2	2
Total	5	17	8	30

Out of total 30 patients, 5 patients were having Mild score (<9) of clinical examination & following final diagnosis:-

1) MCL sprain
2) MCL + ACL Sprain
3) Partial ACL tear
4) Partial LCL tear
5) Partial MCL tear

17 patients had Moderate score (9-11) of clinical examinations with following final diagnosis

1) 3 cases of partial MM tear
2) 2 cases each of partial ACL + MM tear, Partial MCL + ACL tear & Partial MCL + MM tear
3) 1 case each of complete MM tear, LCL sprain, MCL sprain, MCL + ACL sprain, Partial ACL tear, Partial MCL tear, Partial MCL + complete MM tear & Patellar Dislocation respectively.

8 patients had severe score (>11) of clinical examinations with following clinical diagnosis:-

1) 2 cases each of complete MCL + ACL + MM tear & Patellar fracture.
2) 1 case each of complete ACL tear, complete MCL tear, complete MCL + ACL tear & complete MCL + Partial MM tear.

Table 7: Clinical diagnosis and final diagnosis in study group

Final Diagnosis Clinical diagnosis	ACL Tear	ACL +MM Tear	LCL Tear	LCL Sprain	MCL Sprain	MCL Tear	MCL + ACL Sprain	MCL + ACL Tear	MCL + ACL + MM Tear	MCL +MM Tear	MM Tear	ACL + MM Tear	Patellar Dislocation	Patellar Fracture	Total
ACL Sprain	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
ACL Tear	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
ACL + MM Tear	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
LCL Tear	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2
MCL Sprain	-	-	-	-	2	1	-	-	-	-	-	-	-	-	3
MCL Tear	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2
MCL Tear + ACL Sprain	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
MCL + ACL Sprain	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
MCL + ACL Tear	-	-	-	-	-	-	-	3	-	-	-	-	-	-	3
MCL + ACL + MM Tear	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
MCL + MM Tear	-	-	-	-	-	-	-	-	-	4	-	-	-	-	4
MM Tear	-	-	-	-	-	-	-	-	-	-	4	1	-	-	5
Patellar Dislocation	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Patellar Fracture	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Total	3	1	1	1	2	3	2	3	2	4	4	1	1	2	30

Table 8 - Clinical Diagnosis varied from final diagnosis in following cases

Sr. No.	Clinical Diagnosis	Final Diagnosis
1	ACL Sprain	ACL Tear
2	LCL Tear	LCL Sprain
3	MCL Sprain	MCL Tear
4	MCL Tear + ACL Sprain	MCL + ACL Sprain
5	MM Tear	ACL + MM Tear

Other all clinical diagnosis was same as final diagnosis.

Table 9: Final diagnosis and sports in study group

Sports Final diagnosis	Basket ball	Cricket	Football	Hockey	Kabaddi	Kho-Kho	Long Jump	Running	Tennis	Vollyball	Total
Complete ACL Tear	-	-	-	-	-	-	-	1	-	-	1
Complete MCL Tear	-	1	-	-	-	-	-	-	-	-	1
Complete MCL + ACL Tear	-	-	-	-	-	-	1	-	-	-	1
Complete MCL + ACL + MM Tear	-	1	1	-	-	-	-	-	-	-	2
Complete MCL + Partial MM Tear	-	-	-	1	-	-	-	-	-	-	1
Complete MM Tear	-	-	-	-	-	-	-	-	-	1	1
LCL Sprain	-	-	1	-	-	-	-	-	-	-	1
MCL Sprain	1	-	-	-	-	-	-	1	-	-	2
MCL + ACL Sprain	-	-	-	1	-	-	-	-	-	1	2
Partial ACL Tear	-	1	-	-	-	1	-	-	-	-	2
Partial ACL + MM Tear	-	-	1	-	-	-	1	-	-	-	2
Partial LCL Tear	-	-	-	-	1	-	-	-	-	-	1
Partial MCL Tear	-	-	-	-	-	-	-	-	2		2
Partial MCL + ACL Tear	-	-	1	-	-	1	-	-	-	-	2
Partial MCL + Complete MM Tear	-	-	-	-	-	1	-	-	-	-	1
Partial MCL + MM Tear	1	-	1	-	-	-	-	-	-	-	2
Partial MM Tear		1	1		1	-	-	-	-	-	3
Patellar Dislocation	1	-	-	-	-	-	-	-	-	-	1
Patellar Fracture	-	-	-	-	2	-	-	-	-	-	2
Total	3	4	6	2	4	3	2	2	2	2	30

Structures involved in the sports were as follows:

1. Basketball- MCL sprain, Partial MCL + MM tear, Patellar dislocation
2. Cricket- MCL tear, Complete MCL + ACL + MM tear, Partial ACL tear, Partial MM tear
3. Football- Complete MCL + ACL + MM tear, LCL sprain, Partial ACL tear, Partial MM tear
4. Hockey- Complete MCL + Partial MM tear, MCL + ACL sprain
5. Kabaddi- Partial LCL tear, Partial MM tear
6. Kho-Kho- Partial ACL tear, Partial MCL + ACL tear, Partial MCL + Complete MM tear
7. Long Jump- Complete MCL + ACL tear, Partial ACL + MM tear
8. Running- Complete ACL tear, MCL sprain
9. Tennis- Partial MCL tear
10. Vollyball- Complete MM tear, MCL + ACL sprain

Discussion

Ayurveda have explained the concept of *marma* & this study is according to that concept. *Janu marma* is a *vaikalykara marma* and in its explanation we find either deformity but damaged structures is not explained in Ayurveda. This study has been done to understand exact involvement of damaged structures in *marma sthana*.

Maximum no. of patient having traumatic injuries prefers modern science for their treatments. If the damage is not severe an Ayurvedic practitioner can treat the patient with the treatments like *shamana* and

shodhan chikitsa like *guggul kalpas*, *lepa*, *dahan karma*, *jalauka* etc. In case of severe damage an Ayurvedic practitioner can judge whether the patient can be treated with above treatments or referred to the higher centers.

Conclusion

1) By assessment of clinical examination score, it is possible to judge the severity and possibility of treatment by an Ayurvedic practioner.
2) By the assessment of grades of clinical examination clinicians can also judge the structures involved in the traumatic injuries.
3) Clinician can predict the structural damage with the clinical diagnosis prior to radiological investigations.

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