How to Cite:
Kumar, S., Jashanpreet, J., & Singh, R. (2022). Role of platelets rich plasma in tendinopathy: A teaching hospital based study. *International Journal of Health Sciences*, *6*(S1), 9988–9996. https://doi.org/10.53730/ijhs.v6nS1.7362

Role of platelets rich plasma in tendinopathy: A teaching hospital based study

Dr Sumit Kumar
Assistant Professor, Department of Orthopaedics, Maharaja Agrasen Medical College, Agroha, Haryana, India.
Corresponding author email: drsumitkamboj30@gmail.com

Dr Jashanpreet
Medical Officer, Department of Pathology, Government of Haryana, India.

Dr Raj Singh
Professor, Department of Orthopaedics, Pt. B. D. Sharma, PGIMS, Rohtak, Haryana, India.

***Abstract*---**Background: Medication and steroid injection therapy only help to reduce the pain, but exercise is effective as a treatment for regaining function in addition to reduction of pain in tendinopathy. Tendinopathy is a major medical problem. It can be defined as a syndrome of tendon pain, localized tenderness, and swelling that impairs performance. In chronic tendinopathy thee is an increasing degree of degeneration with little or no inflammation present. The application of PRP has been documented in many fields. First promoted by M. Ferrari in 1987 as an autologous transfusion component after an open heart operation to avoid homologous blood product transfusion, there are now over 5200 entries in the NCBI for PRP ranging in fields from orthopaedics, sports medicine, dentistry, otolaryngology, neurosurgery, ophthalmology, urology, wound healing, cosmetic, cardiothoracic and maxillofacial surgery. Materials and Methods: Our prospective study conducted in the Department of Orthopaedics, Maharaja Agrasen Medical College, Agroha, Haryana, India. Patients with chronic tendinopathy like supraspinatus tendinopathy, patellar tendinopathy, tendo A chilles tendinopathy, planter fasciitis, medial epicondylar tendinopathy, lateral epicondylar tendinopathy came to our hospital included in the study after obtaining their informed consent. Diagnostic criteria being pain and tenderness at respective joints, more on movements, X-rays showing sclerosis at greater tuberosity in shoulder, calcanealspur. In few cases sonography of local part done which showed changes of tendinosis. The patients with no improvement with medical treatment for last 3 months with or without physiotherapy included in the study. A

detailed history was obtained for evaluating the mode of trauma, visual analogue score, chronicity, physiotherapy etc. Detail clinical examination and investigations including complete blood count were carried out before giving injection. Results: However the mean age of study group was 38 years for the male. The mean age of study group was 40 years for the female. So it's a low standard deviation which means there was no significant difference between the age of males and females. Fifty percent of males and females belong to 31-40years, 70% of males and females belong to 31-50 years. The chronic tendinopathy was more common in form of tennis elbow and plantar fasciitis. 66% of patients are having plantar fasciitis and tennis elbow. Golfer's elbow was more common in males than females. In these study, patellar tendinopathy was not seen in females. Conclusion: PRP treatment has many advantages in terms of relative safety, easy production, and cost-effectiveness PRP may be used as a new therapeutic option for chronic tendinopathies. Its ease of preparation, relatively low cost and minimal invasiveness are arguments in its favour. This suggests that platelet rich plasma injection takes time to act and this will result in gradual decrease in symptoms. One should consider this treatment before going to surgical treatment for chronic tendinopathies. One of the limitations was that the study was carried out with 6 months of follow up, long term results and follow up would have been ideal.

***Keywords*---**Plasma, Injection, tendinopathy, PRP, otolaryngology, neurosurgery, ophthalmology, patellar tendinopathy.

Introduction

Medication and steroid injection therapy only help to reduce the pain, but exercise is effective as a treatment for regaining function in addition to reduction of pain in tendinopathy [1]. However, exercise takes a long time for recovery, and patient compliance is needed to attain maximal effect [2].

In recent times, autologous growth factors like platelet-derived growth factor and vascular endothelial growth factor found in platelet-rich plasma (PRP) have been established to play a critical role in cell proliferation, chemotaxis, cell differentiation, and angiogenesis [7]. Several studies have reported favorable clinical outcomes with the use of PRP in the treatment of acute and chronic tendinopathies [3,4,5,6,7]

Tendinopathy is a major medical problem. It can be defined as a syndrome of tendon pain, localized tenderness, and swelling that impairs performance. In chronic tendinopathy thee is an increasing degree of degeneration with little or no inflammation present. The application of PRP has been documented in many fields. First promoted by M. Ferrari in 1987 as an autologous transfusion component after an open heart operation to avoid homologous blood product transfusion,[8] there are now over 5200 entries in the NCBI for PRP ranging in fields from orthopaedics, sports medicine, dentistry, otolaryngology,

neurosurgery, ophthalmology, urology, wound healing, cosmetic, cardiothoracic and maxillofacial surgery. The initial popularity of PRP grew from its promise as a safe and natural alternative to surgery. PRP advocates promoted the procedure as an organically based therapy that enabled healing through the use of one's own natural growth factors. In recent years, scientific research and technology has provided a new perspective on platelets. Studies suggest that platelets contain an abundance of growth factors and cytokines that can affect inflammation, postoperative blood loss, infection, osteogenesis, wound, muscle tear and soft tissue healing. Research now shows that platelets also release many bioactive proteins responsible for attracting macrophages, mesenchymal stem cells and osteoblasts that not only promote removal of degenerated and necrotic tissue, but also enhance tissue regeneration and healing. Jumper's knee also known as patellar tendonitis characterized by inflammation of patellar tendon.[9,10,11] It is seen in athletes participating in sports like high jump, basketball, ice hockey, volleyball, rad cycling, soccer, wrestling. It is seen more in males compare to females and symptoms are often serious resulting in long standing impairment of athletic performance. Different sports specific loading characteristics of the knee extensor apparatus, a younger age and higher body weight seem to be risk factors.

Materials and Methods

This was a prospective interventional study undertaken in the Department of Orthopaedics, Maharaja Agrasen Medical College, Agroha, Haryana, India. Patients with chronic tendinopathy like supraspinatus tendinopathy, patellar tendinopathy, tendo A chilles tendinopathy, planter fasciitis, medial epicondylar tendinopathy, lateral epicondylar tendinopathy came to our hospital they were included in the study after obtaining their informed consent. Diagnostic criteria being pain and tenderness at respective joints, more on movements, X-rays showing sclerosis at greater tuberosity in shoulder, calcanealspur. In few cases sonography of local part done which showed changes of tendinosis. The patients with no improvement with medical treatment for last 3 months with or without physiotherapy included in the study. A detailed history was obtained for evaluating the mode of trauma, visual analogue score, chronicity, physiotherapy etc. Detail clinical examination and investigations including complete blood count were carried out before giving injection. Platelet count of blood was checked with that of PRP before giving the injection. Patients who were fitting into the inclusion criteria and gave consent were enrolled and it came to fifty during the time period of this study . Sample size though not very big but thought to be reasonable hence total 50 patients were included. The inclusion and exclusion criteria were as follows. Depending on the table shown above, the result is prepared. If Visual Analogue Scale is less than 20 then the result is excellent; if VAS is between 20 to 49 then the result is good; if VAS is between 50 -69 then the result is fair and if VAS is greater than 70 then the result is poor.

Inclusion Criteria

Patient with symptoms typical tolateral epicondylar tendinopathy, medial epicondylar tendinopathy, supraspinatus tendinopathy, tendo Achilles tendinopathy, plantar fasciitis and patellar tendinopathy, treated with diclofenac

100 mg twice a day or Ibuprofen 400 mg thrice a day or tramadol 100 mg twice a day and physiotherapy for more than 3 months but not improved.

Exclusion Criteria

1. Any skin pathology at local site. 2. Symptoms of< 3 months duration. 3. Patients who have taken chronic anti-platelet therapy for conditions like stroke, myocardial infarction etc. 4. Patients having muscular dystrophy. 5. Patients having more than one chronic tendinopathy. After getting informed consent platelet rich plasma was prepared from patient's own blood. For which blood drawn and it processed by centrifugation. All procedure done under strict aseptic conditions. PRP hence prepared was injected with in 30 minutes of preparation. After giving injection patient was advised to take rest for 3 weeks. Patients were instructed to apply ice for pain and to avoid using NSAID. Physiotherapy was started after 3 weeks of injection as this was causing pain for first 3 weeks. Patients are advised to join their duty after 3 weeks of injection. All the patients were followed up in OPD at 3 weeks, 6 weeks, 3 months and 6 months. At every follow up, range of motion, visual analogue scale and functional activity score recorded. When the patient has started his / her duty, was recorded. Check for development of any complications.

Evaluation

Each patient was evaluated preinjection, 3weeks after, 6weeks after, and 12 weeks after the procedure. Visual Analogue Scale (VAS) were used as outcome measures.

Results

The mean age of study group was 38 years for the male. The mean age of study group was 40 years for the female. So it's a low standard deviation which means there was no significant difference between the age of males and females. Fifty percent of males and females belong to 31- 40years, 70% of males and females belong to 31-50 years. The chronic tendinopathy was more common in form of tennis elbow and plantar fasciitis. 66% of patients are having plantar fasciitis and tennis elbow. Golfer's elbow was more common in males than females. In these study patellar tendinopathy was not seen in females. The follow up shows that most of the patients do not get relief within 3 weeks after injection. The mean of males who got relief within 3 weeks is 0.2 with standard deviation of 0.4. The mean of females who got relief within 3 weeks is 0 with standard deviation of 0.Only 1 patient of planter fasciitis got relief from pain at 3 weeks. Pain relief was considered when visual analogue scale of the patient decreased to at least 50% from pre injection visual analogue scale.

Follow up shows that 16 patients got relief within 6 weeks after injection. Patients with planter fasciitis, tennis elbow, golfer's elbow and patellar tendinopathy seem to get pain relief earlier as compared to patients with supraspinatus and tendo A chille stendinopathy. At 12 weeks 37 patients out of 50 get pain relief is considered when visual analogue scale of the patient decreased to at least50 % from pre injection visual analogue score. Result shows that 46 patients out of 50 get relief within 6 months after injection. As in Table 1,2,3,4, figure 1 and figure 2 stated.

Table 1
Result as per Visual Analogue Scale

Sr no.	Range of Visual Analogue Scale	Results
1	<20	Excellent
2	20-49	Good
3	50-69	Fair
4	>70	Poor

Table 2
Distribution of Patients as per VAS

FAS	Pre injection	At 3 weeks	At 6 weeks	At 12 weeks	At 6 months
>70	46	40	10	4	2
50-69	3	7	26	9	3
20-49	1	3	14	28	7
<20	0	0	0	9	38
Total	50	50	50	50	50

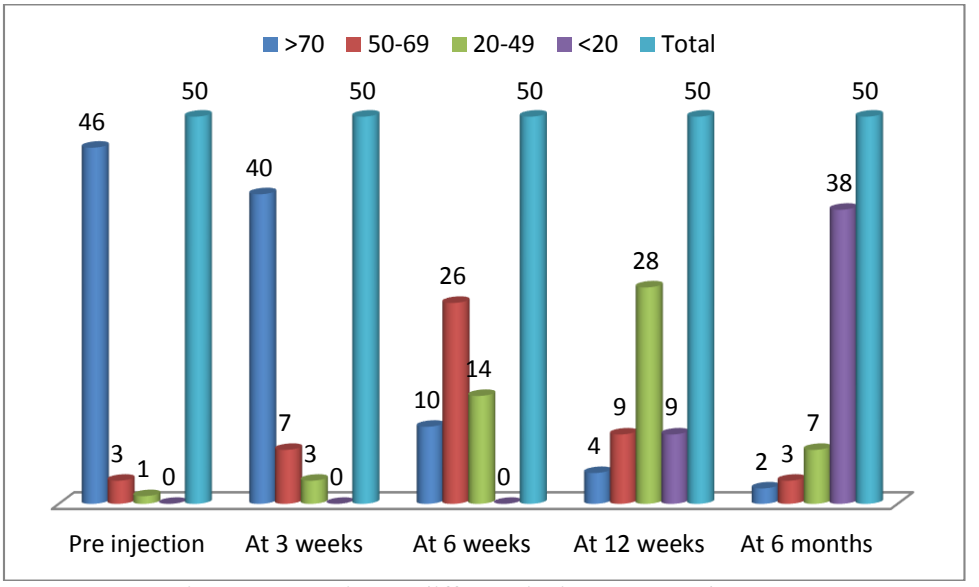

Figure 1: Patients differentiation as per the VAS

Table 3
Distribution of patients as per FAS

FAS	Pre injection	At 3 weeks	At 6 weeks	At 12 weeks	At 6 months
2	46	43	18	6	2
1	4	7	31	38	16
0	0	0	1	6	32
Total	50	50	50	50	50

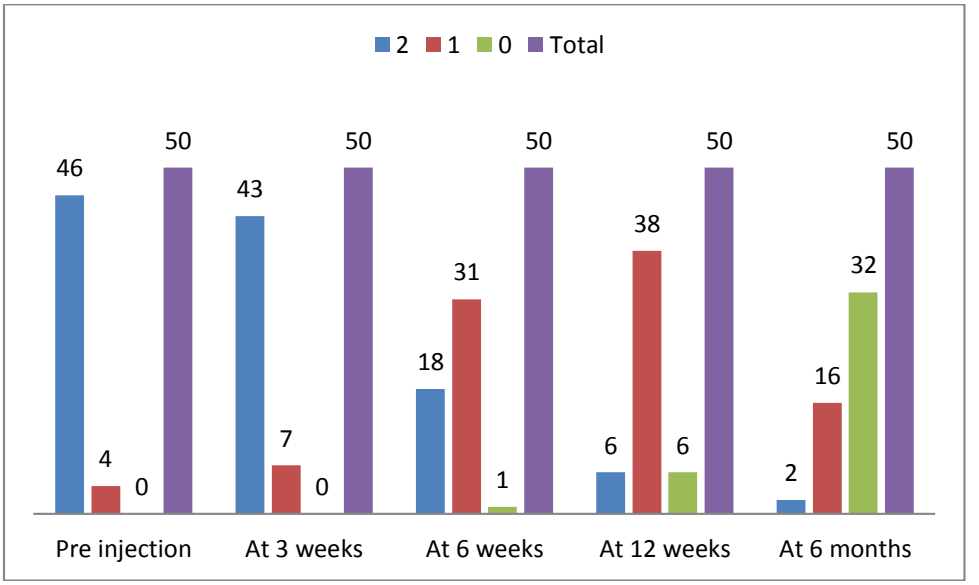

Figure 2: Patients differentiation as per the FAS

Results

Table 4
Quality of PRP Compared with

Quality of PRP [Increase in Concentration Compared to the Baseline Platelet Count]	No of patients	Results
<3.5	15	Excellent-4 Good -6 Fair-3 Poor-2
3.5-5.5	30	Excellent-28 Good -2 Fair-0 Poor-0
>5.5	05	Excellent-5 Good -0 Fair-0 Poor-0

Discussion

We did not analyze leukocyte concentration in the PRP because our study was focused on growth factors in the PRP. Several studies showed that leukocyte-rich PRP showed harmful effects on tendon healing while leukocyte-poor PRP showed

beneficial effects. The primary aim of the current study was to determine whether PRP injection would improve clinical parameters i.e., pain and function. Secondary aim included identifying prognostic factors. This study suggests that 82% of female were having significant pain relief as compared to males which is 94%.[12,13] This study also suggests that if the platelet count in platelet rich plasma injection is more than 3.5 times to baseline than chance of good result increased. By releasing different platelet growth factors, PRP may be used as a new therapeutic option for chronic tendinopathies. Its ease of preparation, relatively low cost, and minimal invasiveness are arguments in its favour. Furthermore, PRP is not associated with any side effects. The findings of this study show that platelet rich plasma injection at the tendon is effective mode of treatment for patients with chronic tendinopathies. In this study, mean age of patients having chronic tendinopathy is 38 years in male and 40 years in female. This study shows that 32% of patients were having improvement in pain and function at 6 weeks of injection and 74% patients having improvement in pain and function at 12 weeks of injection[14]. 92% of patients were having significant pain relief at 6 months. This suggest that platelet rich plasma injection takes time to act and this will result in gradual decrease in symptoms. This study also suggest that plantar fasciitis and tennis elbow are more common than other tendinopathies. In this study 32% patients were having plantar fasciitis and 34% patients having tennis elbow.[15,16,17] This study suggests that 74% of patients having excellent result in terms of pain and function and 16% patients having good result in terms of pain and function. Only 4% of patients having poor result. Platelet rich plasma is very effective in treatment of chronic tendinopathies. These studies used different PRP producing methods, which resulted in differences in platelet concentrate and other compositions, and diverse clinical outcomes. In addition, these differences in cellular composition can affect regeneration effect benefits. A recent study documented that leukocytes in PRP increased catabolic signaling molecules such as matrix metalloproteinase-9 (MMP-9) and interleukin-1β (IL-1β) and these catabolic proteases can perpetuate inflammation and inhibit tissue healing. However, these were in vitro studies and clinical studies did not show any significant difference between leukocyte-rich and leukocyte-poor PRPs.

Conclusion

PRP treatment has many advantages in terms of relative safety, easy production, and cost-effectiveness. The purpose of the study was to find the relation of cellular component with clinical efficacy in tendinopathy and to find the composition of PRP in treating tendinopathy. PRP may be used as a new therapeutic option for chronic tendinopathies. Its ease of preparation, relatively low cost and minimal invasiveness are arguments in its favour. This suggests that platelet rich plasma injection takes time to act and this will result in gradual decrease in symptoms. One should consider this treatment before going to surgical treatment for chronic tendinopathies. One of the limitations was that the study was carried out with 6 months of follow up, long term results and follow up would have been ideal. PRP with good platelet concentration is associated with enhancement of healing due to its bioactive factors. These are transforming growth factor-beta, platelet derived growth factor. Insulin like growth factor 1 and 2, fibroblast growth factor, vascular growth factor, and endothelial cell growth

factor.3The findings of this study show that platelet rich plasma injection under ultrasound guidance at the tendon is effective mode of treating patients with chronic tendinopathies. This suggests that PRP injection takes time to act and this will result in gradual decrease in symptoms. PRP is very effective in treatment of chronic tendinopathies. So, one should consider this treatment before going to surgical treatment for chronic tendinopathies.

Source of funding: None
Conflict of interests: None

References

1. Kuhn JE. Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol. J Shoulder Elbow Surg. 2009;18:138–60.
2. Naslund GK, Fredrikson M, Hellenius ML, de Faire U. Determinants of compliance in men enrolled in a diet and exercise intervention trial: a randomized, controlled study. Patient Educ Couns. 1996;29:247–56.
3. Ahmad Z, Brooks R, Kang SN, Weaver H, Nunney I, Tytherleigh-Strong G, Rushton N. The effect of platelet-rich plasma on clinical outcomes in lateral epicondylitis. Arthroscopy. 2013;29:1851–62
4. Gosens T, Den Oudsten BL, Fievez E, van't Spijker P, Fievez A. Pain and activity levels before and after platelet-rich plasma injection treatment of patellar tendinopathy: a prospective cohort study and the influence of previous treatments. Int Orthop. 2012;36:1941–6.
5. Gosens T, Peerbooms JC, van Laar W, den Oudsten BL. Ongoing positive effect of platelet-rich plasma versus corticosteroid injection in lateral epicondylitis: a double-blind randomized controlled trial with 2-year follow-up. Am J Sports Med. 2011;39:1200–8.
6. Monto RR. Platelet rich plasma treatment for chronic Achilles tendinosis. Foot Ankle Int. 2012;33:379–85.
7. Thanasas C, Papadimitriou G, Charalambidis C, Paraskevopoulos I, Papanikolaou A. Platelet-rich plasma versus autologous whole blood for the treatment of chronic lateral elbow epicondylitis: a randomized controlled clinical trial. Am J Sports Med. 2011;39:2130–4.
8. Blazina ME, Kerlan RK, Jobe FW, et al...Jumper's knee. OrthopClin North Am 1973;4(3):665-78.
9. Lian OB, Engebretsen L, Bahr R. Prevalence ofjumper's knee among elite athletes from different sports: acrosssectional study. Am J Sports Med 2005;33(4):561-7.
10. Zwerver J, Bredeweg SW, van den Akker-Scheek I. Prevalence of jumper's knee among nonelite athletes from different sports: across-sectional survey. Am J Sports Med2011;39(9):1984-8.
11. Kaeding C, Best TM. Tendinosis: pathophysiology and nonoperative treatment. Sports Health 2009;1(4):284-92.
12. Del Buono A, Papalia R, Denaro V, et al... Platelet rich plasma and tendinopathy: state of the art. Int J ImmunopatholPharmacol2011;24(1 Suppl 2):79-83.

13. Vetrano M, Castorina A, Vulpiani MC, et al... Platelet-rich plasma versus focused shock waves in the treatment of jumper's knee in athletes. Am JSports Med 2013;41(4):795-803.
14. Ferrero G, Fabbro E, Orlandi D, et al... Ultrasound-guided injection of platelet-rich plasma in chronic Achilles and patellar tendinopathy. J Ultrasound 2012;15(4):260-6.
15. SeoWY, HaJK, KimJG, et al... Treatment of chronic patellar tendinitis with platelet rich plasma injection.The Korean Journal of Sports Medicine 2012;30(2):110-15.
16. Rha DW, Park GY, Kim YK, et al...Comparison of the therapeutic effects of ultrasound-guided platelet-rich plasma injection and dry needling in rotator cuff disease: a randomized controlled trial. ClinRehabil 2013;27(2):113- 22.
17. Khan KM, Bonar F, Desmond PM, et al... Patellar tendinosis (jumper's knee): findings at histopathologic examination, US, and MR imaging. Victorian Institute of Sport Tendon Study Group. Radiology 1996;200(3):821-7