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ORIGINAL ARTICLE

EFFECTS OF INTRALESIONAL AUTOLOGUS PLATELET RICH PLASMA THERAPY IN PATIENTS WITH DE QUERVAIN'S TENOSYNOVITIS

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Abstract

Backgroud: *To assess the effectiveness of intralesional Platelet Rich Plasma (PRP) therapy for the treatment of deQuervain's tenosynovitis.* ***Methods:*** *The study was randomized controlled trial conducted in the Department of Physical Medicine and Rehabilitation, BSMMU, Dhaka, from April 2020 to March 2021.A total of 54 patients with lateral wrist pain were randomly allocated into two groups and were given interventions. Twenty six patients in group A were treated with 3 ml of autologous platelet rich plasma injection alongthe inflamed tendon sheath of Abductor Pollicis Longus (APL) and Extensor Pollicis Brevis (EPB) tendons while patients in group B were given conventional therapy in the form of rest, ice pack application, analgesics and anti-edema measures for 2 weeks and physical therapy in the form of soft tissue massage.Pain was assessed in VAS. Functional improvement was assessed by Patients Rated Wrist Evaluation (PRWE) scale. Twenty six patients in group A and twenty five patients in group B had completed the six month follow up schedule.* ***Results:*** *The mean age of the participants in group A and group B were 38.23 (± 10.47) and 40.76 (± 8.05) years respectively where >80.0% patients in both groups were female. From 1st month, the VAS scores significantly reduced in group A compared to group B which persisted up to 6 months ($p<0.001$). In group A, 85.0% reduction of pain score and in group B, 71.8% reduction of pain score was achieved after 6 month of treatment. From 1st month, the PRWE scores significantly reduced more in group A compared to group B ($p=0.021$) which persisted up to 6 months ($p<0.001$). In group A, 89.1% functional improvement while in group B, 72.6% functional improvement was achieved after 6 month of treatment.* ***Conclusion:*** *Intra-lesional platelet-rich plasma reduces pain and improves function in patients with de Quervain's tenosynovitis.*

Key words: *deQuervain's tenosynovitis, Platelet Rich Plasma (PRP), Visual analogue scale (VAS), Patients Rated Wrist Evaluation (PRWE)*

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Introduction:

de Quervain's tenosynovitis is classically defined as a stenosing tenosynovitis of the synovial sheath of tendons of the abductor pollicis longus and extensor pollicis brevis muscles in the first compartment of the wrist due to repetitive use.[1]The incidence of de Quervain's is not well-known in primary care, but the prevalence that found in people of UK as 0.52% of them is males and 1.32% in females.[2]

Different treatment modalities for de Quervain's disease has been assessed world wide. However, there is limited evidence that conservative treatment is effective in reducing moderate to severe symptoms of de Quervain's tenosynovitis. Some literature has evaluated effectiveness of ice, nonsteroidal anti-inflammatorydrugs (NSAIDs), heat, orthoses, strapping, rest, and massage but does not show these techniques to be very effective in the treatment of de Quervain's tenosynovitis. Intralesional steroid injections has 83% cure rate, but benefit is usually short term and also associated with some potential complications.[3]

Platelet rich plasma (PRP) is autologous blood derivative with enhanced platelet concentration which basically has properties of biologically enhancing the healing process naturally.[4] A variety of potentially therapeutic growth factors are detected and released from the platelets in significant levels in platelet-rich plasma preparations.[5] The first clinical study assessing the effect of Platelet Rich Plasma (PRP) on de Quervain's tenosynovitis was published by Peck and Ely[3]. They suggest that US-guided percutaneous needle tenotomy (PNT) and PRP injection may be a reasonable option to consider before surgery. Several studies showed that PRP injection is effective in reducing pain and disability who are resistant to conservative treatment.[6,7,8,9,10] However, majority of these studies dealt with small sample size. Moreover, no study about the effectof PRP in patient with de Quervain's tenosynovitis have been carried out in a sample of Bangladeshi population. Therefore, the present study had been conducted to assess the effectiveness of intralesional Platelet Rich Plasma (PRP) therapy for the treatment of de Quervain's tenosynovitis. This research would be helpful to provide evidence based information to the physicians as well as patient groups about the efficacy of PRP injectionin the management of de Quervain's tenosynovitis for pain reduction and functional improvement.

Methods:

The present randomized controlled trial had been conducted at the Department of Physical Medicine & Rehabilitation (OPD, Indoor), Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from March 2020 to February 2021. A total of 54 patients with lateral wrist pain were randomly allocated into two groups (27 patients in each group) and were given interventions. Patients with haemoglobin <10 gm/dL and platelet count $<10^5$ / iL, or patients with rheumatoid arthritis, gouty arthritis, seronegative arthropathies and reactive arthritis, patients with local infection at the site of the procedure, HIV, Hepatitis B or C, coagulation and bleeding disorders, septicaemia and other systemic disorders and who underwent surgical treatment for de Quervain's tenosynovitis, were excluded from the study.

All the cases were clinically evaluated properly with detailed history and physical examinations which includes general physical examinations, MSK and neurological examinations and also Fienkelstien's test. For pre procedure planning: CBC, Plain X-ray of wrist, HbsAg, HCV screening, BT, CT and other relevant investigations were done.

The patients were informed in details regarding the procedure of the study and informed written consent was obtained. Patients were randomly allocated in two groups named as group A and group B by block randomization.

Group- A:

At first, patient was requested to sit with hand in semi-porne position. Then, the lateral side of the wrist was cleaned properly with povidone iodine solution. After that 3 mL of PRP was injected along the inflamed tendon sheath of APL and EPB tendons with a 22- gauge needle without local anesthetic. The steriledressingwas applied at the injection site. Immediately after the injection, the patient was kept in a supine position without moving the arm for 15 minutes. All patients were advised for resting the affected wrist with thumb spica splint for 24 to 48 hours post injection. During this period, patient was instructed to remove the splint 4 times daily for active range of- motion exercises of the wrist and hand. Patient was sent home with instructions to limit their use of the wrist for approximately 24 hours and use cold compression and/or acetaminophen for pain. A formal strengthening program was initiated after stretching. At 2 weeks, the patient began supervised occupational therapy. At 4 weeks after the procedure, patients were allowed to proceed with normal regular activities as tolerated.

Group B:

In this group, patients were given conventional therapy in the form of rest, ice pack application,

analgesics and anti-edema measures for 2 weeks and physical therapy in the form of soft tissue massage.

Semi-structured interviewer administered questionnaire was used to collect data regarding socio-demographic status.Pain was assessed in VAS. Functional improvement was assessed by Patients Rated Wrist Evaluation (PRWE)scale.VAS and PRWE score were charted pre-procedurally onday 0 and post-procedurally 1st month, 3rd months and 6thmonths.

The statistical analysis was conducted using SPSS (statistical package for the social science) version 26 statistical software. The findings of the study were presented by frequency, percentage in tables. Means and standard deviations for continuous variables and frequency distributions for categorical variables were used to describe the characteristics of the total sample. Associations of categorical data were assessed using Chi square test while associations of continuous data were assessed using Independent Sample t test where p<0.05 was considered significant and p<0.001 was considered as highly significant. Here, all p-values were two sided.

Before starting this study ethical clearance was taken from Institutional Review Board (IRB) of BSMMU.

Results:

Twenty six patients in group A and twenty five patients in group B had completed the six month follow up schedule.

Table I : *Baseline characteristics of the study participants (n=51)*

Baseline characteristics	Group A f (%)	Group B f (%)	p value
Age group (in years)			
Up to 35	14 (53.8)	9 (36.0)	0.389
36-45	8 (30.8)	9 (36.0)	
46-55	4 (15.4)	7 (28.0)	
Mean ± SD	38.23±10.47	40.76±8.05	
Gender			
Male	4 (14.4)	5 (17.6)	
Female	22 (84.6)	20 (82.4)	
BMI			
Normal weight	17 (65.4)	10 (40.0)	0.214
Over weight	8 (30.8)	12 (48.0)	
Obese	1 (3.8)	3 (12.0)	
Affected hand			
Right	19 (73.1)	14 (56.0)	0.249
Left	7 (26.9)	11 (44.0)	

f=frequency, SD=Standard deviation, Body Mass Index (BMI)

The mean age of the participants in group A and group B were 38.23 (± 10.47) and 40.76 (± 8.05) years respectively.In group A, 22 (84.6%) were female while in group B, 20 (82.4%) were female. Right hand was affected in 19 (73.1%) and 14 (56.0%) patients in group A and group B respectively. No significant statistical difference was found between the groups regarding age, gender, BMI and affected hand as p>0.05 (Table I).

Table II : *Comparison of study participants by Visual Analog Scale (VAS) score (n=51)*

VAS	Group A (Mean ± SD)	Group B (Mean ± SD)	p value
At base line	7.3 ± 0.8	7.1 ± 0.6	0.264
At 1st month	3.4± 0.5	4.3± 1.1	<0.001
At 3rd month	1.5± 0.8	3.4± 1.0	<0.001
At 6th month	1.1± 0.3	2.0 ± 0.8	<0.001

SD=Standard deviation

There was no significant statistical difference between the groups regarding VAS scores at baseline as p=0.264. From 1st month, there was highly significant statistical difference between the groups regarding VAS scores which persisted up to 6 months (p<0.001) (obtained by Independent sample t test) (Table II).

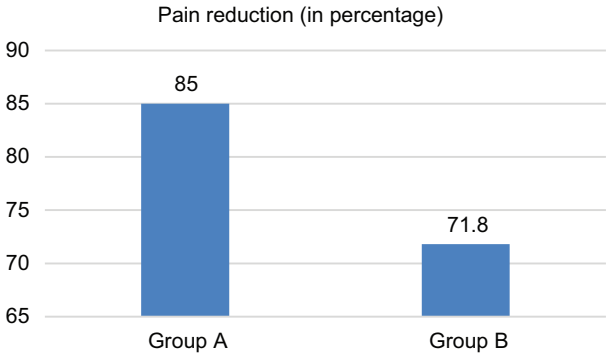

Figure-1. *Reduction of pain (in percentage) of study participants inVAS score (n=51)*

In group A, 85.0% reduction of pain score was achieved while in group B, 71.8% reduction of pain score was achieved after 6 month of treatment (Figure 1).

Table III: *Comparison of study participants by The Patient-Rated Wrist Evaluation (PRWE) score (n=51)*

PRWE	Group A (Mean ± SD)	Group B (Mean ± SD)	p value
At base line	75.1 ± 3.8	73.0 ± 4.8	0.089
At 1st month	27.0 ± 8.3	32.8 ± 9.2	0.021
At 3rd month	17.0 ± 2.4	27.8 ± 9.2	<0.001
At 6th month	8.2 ± 2.9	20.0 ± 5.7	<0.001

SD=Standard deviation

There was no significant statistical difference between the groups regarding PRWE scores at baseline as p=0.089. From 1st month, there was significant statistical difference between the groups regarding PRWE scores which persisted up to 6 months (p<0.001) (obtained by Independent sample t test) (Table III).

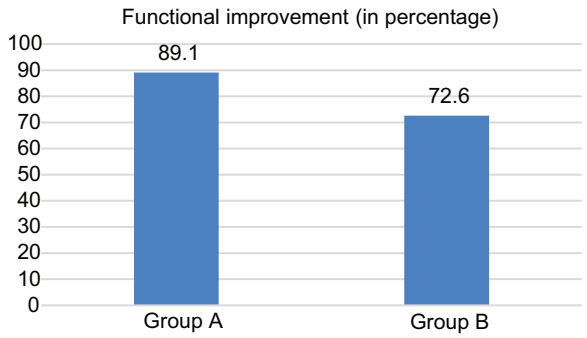

Figure II. *Functional improvement (in percentage) of study participants in PRWE score (n=51)*

In group A, 89.1% functional improvement was achieved while in group B, 72.6% functional improvement was achieved after 6 month of treatment (Figure II).

Discussion:

The present randomized controlled trial had been conducted to assess the effectiveness of intralesional Platelet Rich Plasma (PRP) therapy for the treatment of deQuervain's tenosynovitis. A total of 54 patients with lateral wrist pain were randomly allocated into two groups (27 patients in each group) and were given interventions. Twenty six patients in group A and twenty five patients in group B had completed the six month follow up schedule. Intra-lesional platelet-rich plasma significantly reduced pain and improved function in patients with deQuervain's tenosynovitis.

The results of the present study showed that the mean age of the participants in group A and group B were 38.23 (± 10.47) and 40.76 (± 8.05) years respectively. The typical age of occurrence of de Quervain's disease are within 30 to 50 years.[11] Studies conducted among Bangladeshi patients with de'Quervain's disease also found that the mean age of patients was around 40 years.[12,13]

Most of the patients in both groups were female. It is thought to occur more frequently in women between the ages of 20 and 40[14], including the variant that occurs during pregnancy and the postpartum period[15]. Other studies also found higher proportion of female patients compared to male.[6,12,13]

There is no predilection for right versus left side for de Quervain's disease.[1] However, majority of the patients of the current study had de Quervain's disease on right side which was consistent with the study of Haque, et al.[13]

Before treatment, there was no significant difference between the groups regarding VAS scores. From 1st month, there was highly significant statistical difference between the groups regarding VAS scores which persisted up to 6 months (p<0.001). In group A, 85.0% reduction of pain score was achieved while in group B, 71.8% reduction of pain score was achieved after 6 month of treatment. The case report of Peck & Ely[3]reported 63% reduction in pain from her preprocedure level at 6 months after the procedure. Bender & Elder[6]retrospectively reviewed the charts of8 patients who received at least one injection of PRP and analyzed the short and medium-term outcomes of ultrasound guided platelet-rich-plasma injections for the treatment of de Quervain's tenosynovitis and observed that average VAS scores decreased an average of 87% and these results were maintained at all subsequent follow-up visits for all members of the cohort.The case series of Sikkandar& Sha[16] also found that the VAS score decreased in all three patients. The prospective study of AL-Ardi[7] found that at six month follow up, the VAS score significantly improve from 5.9 to 2.0 after injection with platelet-rich –plasma. Ramesh, et al.[9]prospectively reviewed and compared the efficacy, feasibility and durability of conservative & physical therapy, and platelet rich plasma therapy and reported that from 1st month, there was highly significant statistical difference between the groups regarding VAS scores which persisted up to 12 months (p<0.001).

Functional improvement of wrist was evaluated by The Patient-Rated Wrist Evaluation (PRWE).From 1st month, there was significant statistical difference between the groups regarding PRWE scores which persisted up to 6 months.In group A, 89.1% functional improvement was achieved while in group B, 72.6% functional improvement was achieved after 6 month of treatment.The study of Ramesh, et al.[9]also found that functional improvement was significant in PRP group compared to conventional group.

Three patients (11.5%) in group A complained for mild pain which subsided after application of ice and paracetamol. Minor bleeding occurred in one patient in group A which resolved spontaneously. PRP is prepared from autologous blood, so any concerns of allergic reactions or disease transfer are eliminated. PRP does not promote hyperplasia, carcinogenesis, or tumor growth.[17]

It was mentionable here that within this follow up period, no patient needed second dose of injection and no patient had recurrence.

Some limitations were perceived while planning and conducting the study. Due to COVID-19 pandemic, only 54 patients were included in the study which might not be representing the population and long term follow up could not be done.

Conclusion:

This study concluded that intra-lesional platelet-rich plasma reduces pain and improves function in patients with de Quervain's tenosynovitis. Further comparative studies with large sample size and long term follow up are required to evaluate the long-term outcomes.

Limitation of the study:

Although sample size was calculated statistically, this was small in relation to the huge number of population of our country. It was a single-center study done in tertiary care hospital. Since our study was not a prospective case-control study, we could not calculate the hazard ratios for CIMT values.

Conflict of Interest:

The author stated that there is no conflict of interest in this study

Funding:

No specific funding was received for this study**.**

Ethical consideration:

The study was conducted after approval from the ethical review committee. The confidentiality and anonymity of the study participants were maintained

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