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Review Article

Platelet-Rich Plasma Therapy Role in Treatment of Osteoarthritis

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Abstract

It deals with the role of Platelet-rich plasma therapy in the osteoarthritis and utilization of stem cell theory in the healing and cure of osteoarthritis .and even deal with the origin of Platelet-rich plasma therapy.

Keywords: Stem Cell Theory; Mitosis; Genetics; Platelet-Rich Plasma Therapy; Antibodies; Immunity; Autoimmune Diseases; Healing; Repair

Origin from the stem cell

Basically, in platelet rich plasma therapy the plasma rich in the platelet are delivered through injection.

As platelet are fragments of megakaryocytes and stimulate Regeneration and synthesing the collagen and are synthesized in the body in the infection and hence megakaryocytes are stem cells hence these deliver the origin from stem cell theory.

Classification of Platelet-rich plasma therapy [1]

Most common Classification of Platelet-rich plasma therapy is given below

Classification system	Variables			
Mishra and colleagues[14]	Type of PRP	Platelet enrichment		
	1: increased WBCs and no activation 2: increased WBCs and activated 3: minimal/no WBCs and no activation 4: minimal/no WBCs and activated	A: [platelet] above 5× baseline B: [platelet] below 5× baseline		
PAW system[15]	P (platelets/µl)	A (method of activation)		W (Presence of WBCs)
	P1: [platelet] ⩽ baseline P2: baseline < [platelet] < $7.5 \cdot 10^5$ P3: $7.5 \cdot 10^5$< [platelet] < $1.25 \cdot 10^6$ P4 (> $1.25 \cdot 10^6$ platelets/µl	Exogenous Not exogenous		Above baseline Below baseline
Mautner and colleagues[16]	Absolute [platelet]	[Leukocytes]	[RBCs]	Activation by exogenous agents
	Cells/µl +volume injected	Including neutrophils if > 1%	%	Yes/no
DEPA[17]	Dose injected	Platelet capture efficiency	Purity of PRP [Platelet] with respect to WBC+RBC	Activation method

	A: [platelet] > $5{\cdot}10^9$	A: > 90%	A > 90%	Yes/no
	B: $3{\cdot}10^9$ < [platelet] < $5{\cdot}10^9$	B: 70% to	B: 70% to 90%	
	C: 10^9 < [platelet] < $3{\cdot}10^9$	C: 30% to 70%	C: 30% to 70%	
	D: [platelet] < 10^9	D: < 30%	D: < 30%	

Table 1: PRP, platelet-rich plasma; RBC, red blood cell; WBC, white blood cell.

Reference	PRP used	PRP characteristics (SS versus DS/Mishra classification/activation)	Intervention (n of injections/ time interval, w/ volume, ml)	Control(s) (n injections/time interval, w/volume, ml)
Vaquerizo and colleagues[39] Level I evidence RCT	PRGF-Endoret	LP-PRP SS/4B/$CaCl_2$	3/1/8*	HA (Durolane): 1/-/NR
Patel and colleagues[40] Level I evidence RCT	Custom	LP-PRP SS/4B/$CaCl_2$	1/-/8	PRP: (2/3/8) Saline: (1/-/8)
Filardo and colleagues[41] Level I evidence RCT	Custom	LR-PRP DS/(NR)A/NR	3/1/5	HA (Hyalubrix >1500 kDa): 3/1/NR
Cerza and colleagues[42] Level I evidence RCT	ACP	LP-PRP SS/3A/No	4/1/5.5	HA (Hyalgan): 4/1/20 mg
Sanchez and colleagues[43] Level I evidence RCT	PRGF-Endoret	LP-PRP SS/4B/$CaCl_2$	3/1/8	HA (Euflexxa): 3/1/NR
Say and colleagues[44] Prospective comparative clinical study	Custom (PRGF-Endoret protocol)	LP-PRP SS/4B/$CaCl_2$	1/-/2.5	HA (NR): 3/1/2.5
Spakova and colleagues[45] Prospective, cohort study with a control group	Custom	LR-PRP Triple S/1B/No	3/1/3	HA (Erectus): 3/1/NR
Li and colleagues[46] [article in Chinese]	Weigao kit	LR-PRP DS/NR/NR	3/3/3.5	HA (Sofast)
Filardo and colleagues[47] Level of evidence II Observational study	LP-PRP (PRGF-Endoret protocol)	LP-PRP SS/4B/$CaCl_2$	3/3/5	LR-PRP (DS/2B/$CaCl_2$): 3/3/5 ml
Kon and colleagues[48] Level of Evidence II Prospective comparative study	Custom	LR-PRP DS/2A/$CaCl_2$	3/2/5	HA (MW: 1000-2900 kDa): 30 mg/2 ml HA (MW: 500-730 kDa): 20 mg/2 ml
Sanchez and colleagues[49]	PRGF-Endoret	LP-PRP SS/4B/$CaCl_2$	3/1/8	HA
Duymus and colleagues[50] Level of evidence I RCT	Ycellbio kit	LR-PRP SS/1A/No	2/4/5	HA (Ostenil Plus): 1/-/40 mg ozone gas: 4/1/15 ml
Kon and colleagues[48] Level of evidence I RCT	Custom	LR-PRP DS/2B/$CaCl_2$	3/1/5	HA (Hyalubrix): 3/1/30 mg
Forogh and colleagues[10] RCT	TUBEX kit	LR-PRP DS/(NR)B/Ca gluconate	1/-/5	Depo Medrol (CS): 1/-/40 mg
Görmeli and colleagues[51] Level of evidence I RCT	Custom	LR-PRP DS/2A/$CaCl_2$	3/1/5	PRP: 1/-/5 ml (single injection) HA (Orthovisc): 3/1/30 mg Saline: 3/1/NR
Montanez-Heredia and colleagues[52] RCT	Custom	LP-PRP DS/(NR)A/NR	3/2/NR	HA (Adant): 3/15 d/NR

Paterson and colleagues[53] RCT	Custom	LR-PRP DS/NR/ultraviolet	3/1/3	HA (Hylan G-F 20): 3/1/3 ml
Raeissadat and colleagues[54] KOA injection choices NR RCT	Rooyagen kit	LR-PRP DS/1A#/No #(5.2±1.5)× (4.8±1.8)× baseline values in 1st and 2nd injections	2/4/4-6	HA (Hyalgan): 3/1/20 mg
Smith[55] Level of evidence I RCT	ACP	LP-PRP SS/NR/NR	3/1/3-8	Saline: 3/1/3-8 ml

Table 2: PRP characteristics, controls and interventions of trials reviewed in various works [2].

*i.e. 3/1/8 means three injections at a 1-week interval at 8 ml of PRP each.

CS, corticosteroid; DS, double spin; HA, hyaluronic acid; LP-PRP, leukocyte-poor PRP; LR-PRP, leukocyte-rich PRP; MW, molecular weight; NR, not reported; PRGF, plasma rich in growth factors; PRP, platelet-rich plasma; RCT, randomized clinical trial; SS, single spin.[3]

#is connected to the values immediately below, (5.2 ± 1.5) X (4.8 ± 1.8). According to Mishra classification, PRP is labelled "A" if platelet concentration is "at or above 5 times the baseline" and B otherwise, and in this case, concentration is in the cut-off number.

Treatment of knee osteoarthritis

Main reason for occurrence of the osteoarthritis is the cartilage structure modification their is decrease in the thickness of the cartilage (hyaluronic cartilage) [4] leading to the osteoarthritis and it mainly occur in the old age in above 40 -60 years and 60 years above [5].

Characterised by

- Joint pain
- Difficulty in walking [6]

Role platelet rich plasma therapy

Basically platelet release the collagen during any injury and lead to inflammation and vasodilation in vascular injury [7].

So plasma rich platelet rich plasma therapy is used in osteoarthritis as it release the collagen and basically origin from the stem cell and increase the thickness of hyaluronic cartilage and reduce the symptoms of osteoarthritis

As shown in the graphs and charts and studies below
Statistical presentation of the patient shown below

Participant's Variables	
Age (year)	
Mean ± SD	59.06 ± 8.78
Range	40–81
Gender	
Male. *n* (%)	72 (47%)
Female. *n* (%)	81 (53%)
BMI (kg/m^2)	
Mean ± SD	25.4 ± 3.9
Range	21.5–29.3
Side	
Left. *n* (%)	67 (43.8%)
Right. *n* (%)	86 (56.2%)
Kellgren-Lawrence Grade	
Grade 1. *n* (%)	27 (17.7%)
Grade 2. *n* (%)	58 (37.9%)
Grade 3. *n* (%)	68 (44.4%)

Figure 1: Shows the basic idea amount of the person participated in the experimentation [8].

Discussion

- Origin of Platelet-rich plasma therapy
- Characteristics of platelet rich plasma therapy
- Use of platelet rich plasma therapy in the treatment of osteoarthritis

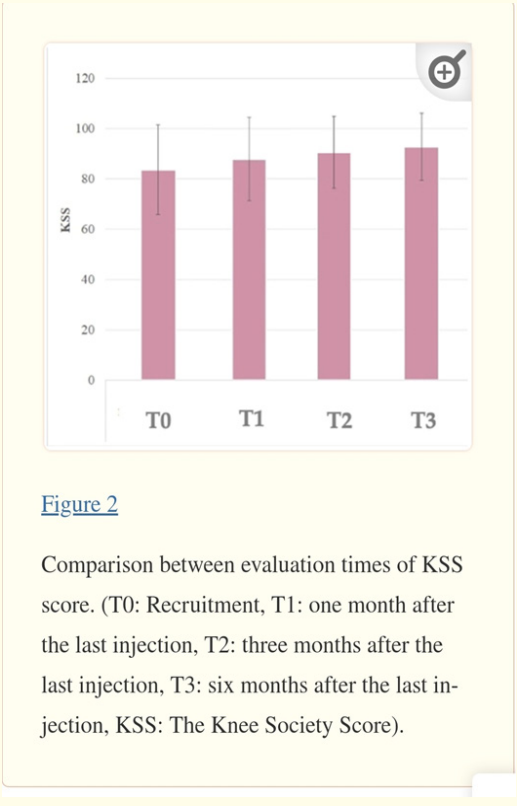

Figure 2

Comparison between evaluation times of KSS score. (T0: Recruitment, T1: one month after the last injection, T2: three months after the last injection, T3: six months after the last injection, KSS: The Knee Society Score).

Figure 2: Shows the knee society score of the persons participated in the platelet rich plasma therapy [9].

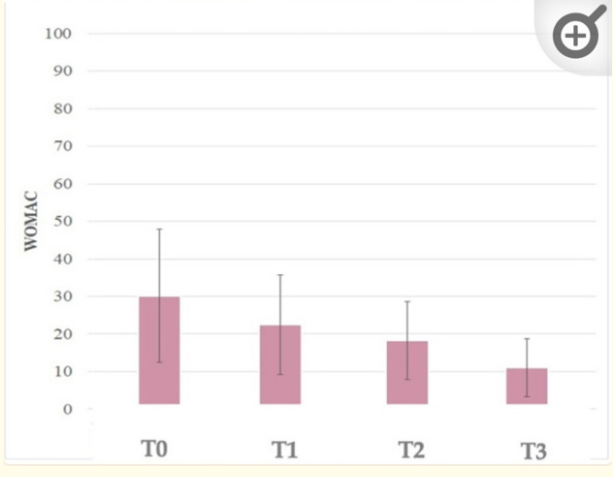

Figure 3: Shows the WOMAC resolvement of person after the platelet rich plasma therapy [10].

Conclusion

- Platelet rich plasma therapy is originated from stem cell therapy.
- Platelet rich plasma therapy can be used in treatment of osteoarthritis.

Conflict of Interest

Author declare their is no conflict of interest.

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