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# THE CLINICAL EFFECTIVENESS AND SAFETY OF PRP INJECTIONS : SINGLE-SPIN VERSUS TWO-SPIN CENTRIFUGATION IN FACIAL REJUVENATION

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**ABSTRACT :** The purpose of this study was to compare the clinical effectiveness and safety of PRP injections using either single-spin or two-spin preparation method. Forty patients (all are females with ages between 21-56 years old) were included in this study. The patients are divided into two groups, the first group 20 patient were injected by PRP which was prepared by single centrifuge at 3000 rpm for 10 minute. The second group: 20 patients were injected by PRP which was prepared by two centrifuge method where the first centrifuge was done at 3000 rpm for 10 minute for isolation of plasma then the plasma was condensed by second centrifuge at 3000 rpm for 10 minute then the PRP injected alone without platelet poor plasma (PPP). By using objective clinical assessment and subjective satisfaction scale revealed : In first group, 4 patient showed improvement with the score of 4.1-5 (80-100%), 6 patients with the score of 3.1-4 (60-80%), 6 patients with the score of 2.1-3 (40-60%) and 4 patients with the score of 1.1- 2 (20- 40%) at the end of study. In second group, 3 patient showed improvement with the score of 4.1-5 (80-100%), 8 patients with the score of 3.1-4 (60-80%), 7 patients with the score of 2.1-3 (40-60%) and 2 patients with the score of 1.1- 2 (20- 40%). There are controversies regarding the optimal method of PRP preparation that produce the best clinical effectiveness. Within the limit of this study, the one-spin procedures produce comparable results with two- spin procedure for safe therapeutic application.

**Key words :** Platelet-rich plasma, centrifugation, clinical effectiveness.

## INTRODUCTION

Platelet rich plasma (PRP) is a portion of the plasma that has platelet concentrated above baseline level that include growth factors, chemokine factors, cytokine and adhesive proteins (like PDGF and TGF- $\beta$ ), which have both mitogen and chemotactic properties. These proteins are stored in alpha granules and after injection of PRP into dermis the platelets are granulated (due to endogenous activation in tissue) and release these growth factors (Marx, 2004). Age related changes on the face cause as result exposure to sunlight, nutritional habits, and hereditary factors that result in degeneration of elastic fibres, degradation of collagen and collapse of fibroblast that loses skin elasticity and resilience that lead to facial bone loss, facial soft tissue loss, dermal dystrophy, loss of subcutaneous tissue, redistribution of fat and dermal thickening then contribute to the facial folds (Jacovella, 2006).

The growth factors and proteins are interacted with fibroblasts and endothelial cells leading to cell proliferation, migration and synthesis of connective tissue

matrix (Dhurat and Sukesh, 2014). Autologous PRP is widely used in facial rejuvenation with different preparation methods and inconclusive effectiveness. Platelets count in prepared PRP differs according to many factors: number of spins, centrifugal acceleration, time of centrifugation, activation process and volume of whole blood. The clinical effectiveness of PRP is also affected by clinician handling including technique of injection, number of sessions, amount of injected PRP in each site (Perez *et al*, 2014).

There are variations in recommended protocol for harvesting PRP that may lead to different composition and different biological response (Tamimi *et al*, 2007). More than 16 commercial platelet isolation kits are available with variable centrifugation procedure that produce different counts of platelets, white blood cells, red blood cells and growth factors (Wasterlain *et al*, 2017).

The main aim of our study is to assess the clinical effectiveness of PRP injections using two methods of PRP preparation in term of degree and onset of change in skin texture, glowing and degree of patient satisfaction.

## MATERIALS AND METHODS

Twenty patients (all are females with ages between 21-56 years old) were recruited in this study. On enrollment, each patient gave informed consent, answered a comprehensive questionnaire, and was clinically assessed. Inclusion criteria include patient with grade 1 or 2 of Allegan skin roughness scale. All patients have the willing to rejuvenate their skin by using PRP.

The patients were divided into two groups, the first group : the patient is injected by PRP, which was prepared by single centrifuge at 3000 rpm for 10 minute. The second group: the patient is injected by PRP, which was prepared by two centrifuge method where the first centrifuge was done at 3000rpm for 10 minute for isolation of plasma then the plasma was condensed by second centrifuge at 3000 rpm for 10 minute then the PRP injected alone without platelet poor plasma (PPP).

**A. The preparation of PRP :** In this study, a commercial kit (plasmolifting™) was used to prepare PRP. Drawing 8 ml of blood from patient into plasmolifting vacuum tube, which contains heparin sodium as anticoagulant and polyethylene separating gel. Then the tube is placed into the centrifuge at an equal distance apart, in the opposite positions. The tube was centrifuged at 3000 rpm for 10 min, the plasma would be isolated and then transported to another tube by pipette. The PRP is ready for injection in first group, while in second group, the plasma was re-centrifuged again at 3000 rpm for 10 min for condensation and the discard platelet poor plasma PRP (upper 1/2 of plasma) and inject PRP (lower 1/2 of plasma).

**B. The Injection technique :** After application of topical EMLA cream, ice-pack and sterilization of face, 27g needle was used to inject PRP by using nappage method in three main esthetic areas: per orbital (1 ml), cheek (1 ml) and nasolabial area (1 ml).

**C. The clinical assessment :** The changes in pigmentation, skin elasticity and smoothness were performed subjectively and objectively by using Global aesthetic improvement scale (GAIS) with photographic evidence. Objective clinical assessment (skin texture, smoothness and any change in pigmentation) and subjective satisfaction scale were reported for overall improvement at the end of this study.

Objective clinical assessment were classified into 5 scores, where 0–1 (<20% improvement), 1.1–2 (20-40%), 2.1–3 (40–60%), 3.1–4 (60–80%), 4.1-5 (80-100%). Subjective satisfaction scale includes 4 grades, where 0 (unsatisfied), 1 (Partially satisfied), 2 (Moderately satisfied) and 3 (completely satisfied).

The assessment and recording of any side effects was performed at 2, 4, 8, 12 weeks post injection.

### Statistical analysis

Analysis of data was performed by using Statistical Package for Social Science (SPSS) system/ version 17 and Microsoft Office Excel 2007. Results were expressed as mean  $\pm$  S.D. P-value was considered significant when it is less than 0.05. The analysis of variance (ANOVA) was also applied.

## RESULTS

The current study revealed that, in first group, 70% of patients were satisfied with results of PRP injections and seeking further sessions. Improvement in skin texture, resiliency and glowing were reported in all patients in all esthetic injectable areas to a variable degree according to objective assessment scores. In second group, 90% of patients were satisfied (Table 1).

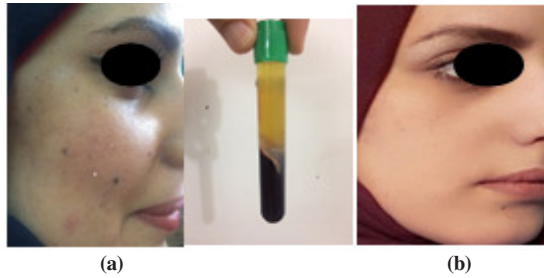
The results illustrated that out of 20 subjects, four patients in group one shows complete improvement with score 4.1-5 (improvement between 80-100%) and with score 3.1-4 (60-80%), 2.1-3 (40-60%) 6 patients for each score and only 4 patients revealed 20-40% improvement, which was in score 1.1-2, the results of group 2 also appeared in Table 2 and Figs. 1, 2. However, no significant different between two group at  $P \leq 0.05$ .

Mild burning sensation at and after of injection was the common complication and no further complications were reported.

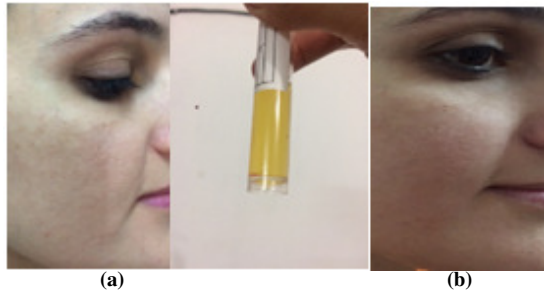
## DISCUSSION

Correction of facial folds and restoration to its original shape is a key approach to rejuvenation and enhancement of facial appearance. Several treatment modalities have been reported and currently being used regularly in the aesthetic clinics (Sevilla *et al*, 2015). The optimal method of PRP preparation that produces the best clinical effect in facial rejuvenation isn't established. There are different protocols for preparation of PRP regarding number and time of centrifugation, force of gravity (rpm) and addition of other synergistic materials like vitamin C, soft hyaluronic acid (Ulusal, 2017).

The first spin (also called hard spin) of centrifugation separates the red blood cells from the plasma, which contains the platelets, the white blood cells and the clotting factors (Kapoor, 2014). The second spin (called the soft spin) further separates the platelets, white blood cells and few remaining red blood cells from the plasma (Mehryan *et al*, 2014). Regarding facial rejuvenation, some researchers use single centrifugation (Sclafani, 2011; Amgar *et al*, 2011; Redallei *et al*, 2010; Zenker, 2010),



**Fig. 1 (a) :** pre-injection and **(b)** post-injection at 4 weeks of PRP (one-spin procedure).



**Fig. 2 : (a)** pre-injection and **(b)** post-injection at 4 weeks of PRP (two-spin procedure).

**Table 1 :** Subjective satisfaction scale.

Grade	Improvement	Group 1		Group 2	
		Number	%	Number	%
0	No improvement	0	0%	0	0%
1	Partially satisfied	4	20%	2	10%
2	Satisfied	14	70%	18	90%
3	Completely satisfied	2	10%	0	0%

**Table 2 :** Objective assessment scores.

Score	Rating %	Improvement	Group 1		Group 2	
			No.	Mean ± S.E.	No.	Mean ± S.E.
4.1-5	80-100%	Very much imp.	4	4.4 ± 1.3	3	4.4 ± 2
3.1-4	60-80%	Much imp.	6	3.5 ± 1.2	8	3.1 ± 1.1
2.1-3	40-60%	Improved	6	2.5 ± 0.9	7	2.48 ± 1
1.1-2	20-40%	Low imp.	4	1.7 ± 0.4	2	1.6 ± 0.4
0-1	< 20	No change	0	0	0	-

while others use double centrifugation in their studies (Mikhaeland El-Esawy, 2014; Shin *et al*, 2012). However, all preparation methods of PRP result in significant increase in platelet count compared to native blood.

In the present study, the two-spin procedure did not produce significant clinical effectiveness than the one-spin procedures and both procedures produce comparable results for therapeutic application. This result in same line with Mazzocca *et al* (2012), they observed that no significant different between the two-step procedure versus one-step procedures. Also, Zimmermann *et al* (2003) mention that the single-spin method had a significantly higher concentration of the factors HGF, IGF-1 and

PDGF-AB in comparison with the double-spin method and this increase may be due in part to higher amounts of white blood cells and/or platelets, which correlate with variable levels of growth factors. In this regard, Nagata *et al* (2010) explain the clinical effectiveness of single-spin procedure as a significant increase in platelets count and growth factor level as well as support the effectiveness of a one-step procedure to produce comparable amounts of platelets for therapeutic application.

Anitua (1999) described single-spin technique for enhancement and acceleration of bone regeneration and more fast and predictable soft tissue healing in future sites for implants that were treated with PRP prepared according to a single-spin technique. Other authors have reported obtaining platelet concentrations of 356% using the single spin technique (Eby, 2002).

The age of patient is important for optimal results. previous studies have found that PRP is less effective if given to elderly patient due to poor tissue repair mechanisms. Although, there are no significant changes in the platelet concentration or in the concentration of growth factors in relation to age according to Weibrich *et al* (2004).

The clinical efficacy of PRP injections is also affected by technique of injection. The injection must be performed in the superficial dermis. It can be done by using a nappage technique, needle bevel up similar to mesotherapy injections in order to enhance the skin texture, glow and hydration (Zenker, 2010). Due to the autologous nature of PRP, no serious complications were reported in our study such as allergic reaction, infection and toxicity.

### CONCLUSION

The aim of PRP injections are to reduce the facial volume loss, facial wrinkle appearance and improve the resilience of skin as the newly synthesized collagen fibers may improve the structural integrity of the dermal matrix and stimulate fibroblast cells to produce more collagen fibers. The clinical effect of PRP need multiple sessions because the quantity and quality of collagen fibers may not be sufficient for optimal results. Also, there are controversies regarding the optimal method of PRP preparation that produce the best clinical effectiveness. Within the limit of this study, the one-spin procedures produce comparable results with two- spin procedure for safe therapeutic application.

### Ethical approval

The Ethical considerations, which approved by the Medical Ethics Committee of the Ministry of Health in Iraq.

### Patient consent

Informed consent was obtained from the patient.

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