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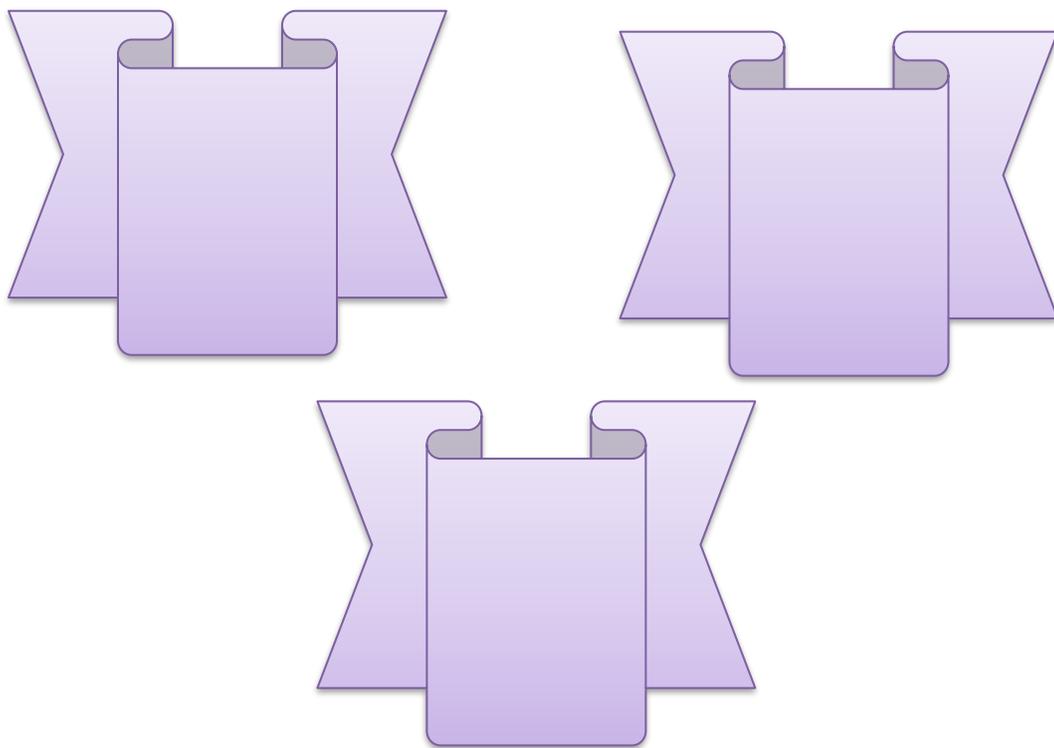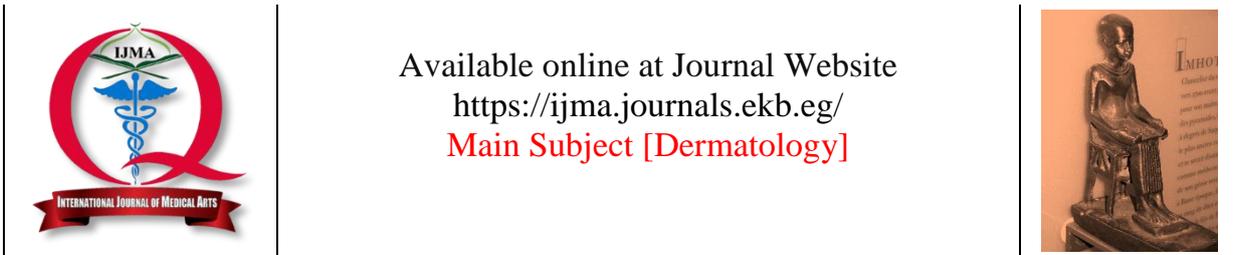
Original Article

Efficacy and Safety of Platelet Rich Plasma after Hair Transplantation of Male Androgenetic Alopecia: A Pilot Study

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ABSTRACT

Background: Numerous medications are used to treat androgenetic alopecia [AGA] which is a common dermatological disorder that has a negative psychological impact on those who are affected. However, hair transplantation, particularly using Follicular Unit Extraction [FUE], is still the standard surgical treatment for this condition.

Aim of the work: This study aims to evaluate the efficacy and safety of Platelet Rich Plasma [PRP] after hair transplantation by Follicular Unit Extraction [FUE] of males' androgenetic alopecia.

Patients and Methods: In this prospective study, 15 AGA patients treated with FUE plus PRP injections, Dermoscope was used to confirm the diagnosis and follow up.

Results: There is significant increase in follicular hair density and length from baseline to the end of 6 month, no reported scalp redness beyond the first month.

Conclusion: PRP after FUE giving faster hair density, reducing the catagen loss of transplanted hair, early recovery of the skin and faster appearance of new anagen hair.

Keywords: AGA; FUE; PRP.

INTRODUCTION

One of the most widespread conditions causing hair loss is androgenetic alopecia [AGA] distinguished by androgen-related gradual thinning of hair in a particular pattern. Regardless of age or stage of baldness, it causes loss of self-esteem, decreased confidence, and distress in affected males. The pathophysiology of the illness is primarily determined by genetic factors and androgens [1].

The ideal technique for treating AGA surgically has been established as follicular unit hair transplantation [FUE]. Surgery and medical treatment can be combined to have a positive synergistic impact [2].

According to **Abdelkader *et al.*** [3], soaking hair transplants in PRP before to implantation improves density and thickness of hair also up taking of grafts. PRP injections' primary objective is to deliver high levels of growth factors to the scalp in order to promote hair growth [4].

Comparing intra-operative PRP therapy to placebo helps FUE transplant individuals achieve faster density, reduction loss of post transplantation catagen hair, recover their skin more quickly, and increase dormant follicles activation [5]. Therefore, this study aims to evaluate the efficacy and safety of Platelet Rich Plasma [PRP] after hair transplantation by Follicular Unit Extraction [FUE].

PATIENTS AND METHODS

This study was done on 15 patients diagnosed with AGA by dermoscopy and candidate for FUE hair transplantation, with age between 20 years and 60 years had attended to the Dermatology and Andrology outpatient clinic of Al-Azhar University Hospital [Assiut] from September 2019 to September 2021.

All the included patients are subjected to FUE hair transplantation in addition to PRP by injection of 0.1 cc for every square centimeter in the recipient scalp with the following regimen for three consecutive months; 1-week post-operative; 2 weeks post-operative; 3 weeks post-operative.

Evaluation was done by Trichoscopic assessment of transplanted hair for detection of density, length and redness. The study was approved by the local Ethics Committee of the Faculty of Medicine, Al-Azhar University, Assiut,

Study included male patients older than 20 years old with [AGA] Stages II to VI according to the Hamilton-Norwood classification and who have not received any sort of treatment for AGA, at least in the previous three months. While patients with cicatricial alopecia, having cancer, platelet abnormalities, anemia, or bleeding problems, patients who are receiving therapy for skin diseases or infection, is currently using nonsteroidal anti-inflammatory medications, or prone to keloids were excluded.

Operative Technique applied by using FUE hair transplantation based on micro-motor and straight hand piece, Jewelers Micro Forceps [Extraction and implantation], punches of size 0.85 mm and needle holder and dressing as showed at figures [1].

Preoperative marking included the new hairline as shown at the figure [2]. It should be created at a specific distance from the glabella, ranged from 7 to 9 cm from glabella.

Site of donor were suitable density of hair on the back and sides of the scalp and extraction were avoided of higher level from back as showed in figure [3].

All included patients were anesthetized by 30 ml of xylocaine, 30 ml of normal saline, and 1 ml of an adrenaline solution were combined in our preparation [1:1000]. The hairline in the temporal region were injected to block the zygomaticotemporal nerve and finish the recipient site's ring block.

Follicular units harvested of hair grafts by the usage of sharp punches we have used in this study 0,85 mm diameter sized punches. Storage of the grafts of the hair follicle as shown in figure [4]. Grafts were stored in solution [cold saline] put at gauze during procedure time. Creating recipient sites in the recipient area using a scalpel knife with a blade width of about 1.1 mm or the No. 11 scalpel knife kept on the needle holder using implantation jewelers to insert the graft. The dressing was exposed or closed according to site and patient tolerance; the closed dressing was removed from 2-4 days postoperatively.
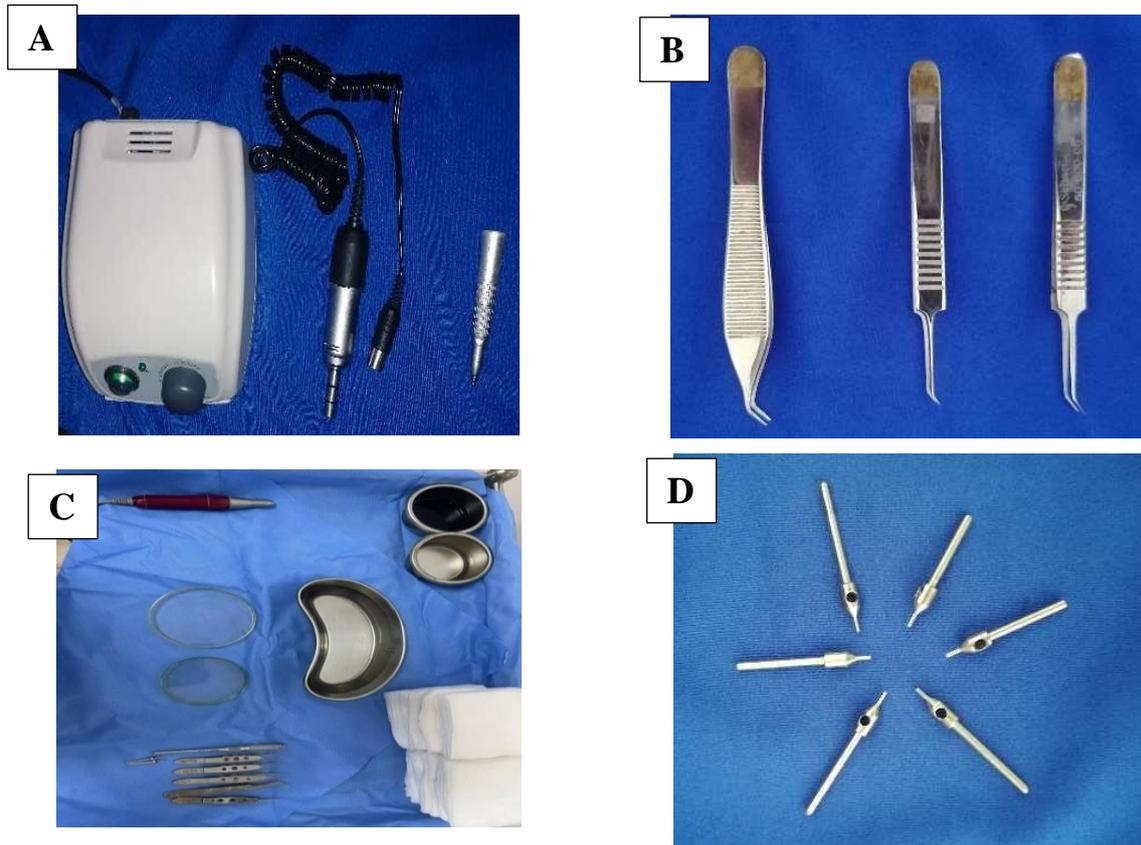
Figure [1]: Tools used in FUE procedure. A] Micromotor & straight hand piece, B] Jewelers, C] needle holder and dressing, D] Micro Forceps [Extraction & implantation].

Figure [2]: Anterior hair line created at 9 cm from glabella

Figure [3]: Site of safe donor area

Figure [4]: Extracted hair grafts at storage solution

Preparation of PRP [settling method]

It was done according to **Makki *et al.*** [6] by easy and least cost way. Initially, whole blood will be collected from the antecubital vein of the patient [10 ml]. The blood then introduced into five tubes containing sodium citrate as an anticoagulant, 2 ml of blood in each tube. Tubes are then left for 20 minutes, so blood cells will settle down and the plasma containing platelets was above. Then, plasma was collected into another two empty tubes which centrifuged at 500 rpm for 30 seconds. After removal of upper supernatant plasma from each tube [about 1/3 of total fluid produced] which contains platelet-poor plasma, total amount of yielded PRP was about 2 ml and it was loaded in 1 ml insulin syringes, ready for injections and no activators are added.

Statistical Analysis: Statistical analysis was performed using GraphPad Prism version 8.0.2 [GraphPad Software, La Jolla, CA]. Student's t-test was applied to compare between two groups of normally distributed variables, while ANOVA test was used to compare between more than two groups of normally distributed variables. ANOVA repeated measure post hoc test [Bonferroni] was used to detect significance between periods. P-value was considered significant if < 0.05.

RESULTS

This study was conducted on 15 patients who have androgenetic alopecia and candidate for hair transplantation. they were subjected to hair transplantation and PRP. There was no significant relation between the follicular hair density and demographic data.

The follicular hair density at 6th month did not show a significant correlation with age or duration as shown in table [1].

Hair transplantation is a minimally invasive procedure with just modest side effects, only two patients in the had a complication in the form of ingrowing hair.

As regard to the follicular density, there was significant increasing in the mean of follicular density from [1.20 ± 1.08] at baseline to [9.67 ± 2.35] [21.00 ± 5.32] [27.00 ± 3.91] during the 1st, 2nd and 3rd month respectively with p-value <0.001. At the end of 6 month the mean of follicular density was increased 0.001 significantly to [27.80 ± 3.84] with p-value < 0.001 from baseline point [table 2].

As regard to the Hair shaft length, it showed significant increasing in the mean of Hair shaft length from [0.20 ± 0.41] at baseline to [1.07 ± 0.26] & [2.20 ± 0.86] & [3.13 ± 1.13] during the 1st, 2nd and 3rd month respectively with p-value <0.001. At the end of 6 month the mean of Hair shaft length was increased significantly to [4.13 ± 0.74] with p-value <0.001 form baseline points as shown in table [3].

In our study, we did not find scalp redness beyond the first month.

Table [1]: Demographic and Clinical Characteristics of AGA Patients

		PRP [n=15]
Age [years]		38.60 ± 6.98 [28-52]
Residence	Rural	3 [20.0]
	Urban	12 [80.0]
Evidence of fibrosis	Absent	10 [66.7]
	Present	5 [33.3]
Duration [years]		8.60 ± 4.84 [2-20]
Grade	II	1 [6.7]
	III	2 [13.3]
	IV	4 [26.7]
	V	5 [33.3]
	VI	3 [20.0]
Single implanted grafts		15 [100.0]

Data expressed as mean ± SD [range], frequency [percentage].

Table [2]: Difference of hair densities from baseline to the 6th month

FUG density [cm^2]	PRP		P$_a$ -value
	Mean ± SD	95% CI	
At baseline	1.20 ± 1.08	0.60 - 1.80	
1 months	9.67 ± 2.35	8.37 - 10.97	
2 months	21.00 ± 5.32	18.05 - 23.95	< 0.001*
3 months	27.00 ± 3.91	24.83 - 29.17	
6 months	27.80 ± 3.84	25.78 - 30.35	
Sig bet period	P$_1$< 0.001*, P$_2$ <0.001*, P$_3$ 0.299		

*P value was considered significant if < 0.05. CI, confidence interval. Pa-value for comparing between group at baseline and 1,2,3 and 6 months after application of PRP. Sig bet periods were done using post hoc test [Bonferroni] for ANOVA with repeated measures. P1: P-value for comparing between pre and 3 months after treatment. P2: P-value for comparing between pre and 6 months after treatment. P3: P-value for comparing between 3 and 6 months after treatment. Data expressed as mean ± SD.

Table [3]: Difference of hair shaft length from baseline to 6 months

Hair shaft length [mm]	PRP		P$_a$ -value
	Mean ± SD	95% CI	
At baseline	0.20 ± 0.41	-0.03 - 0.43	
1 months	1.07 ± 0.26	0.92 - 1.21	
2 months	2.20 ± 0.86	1.72 - 2.68	<0.001*
3 months	3.13 ± 1.13	2.51 - 3.76	
6 months	4.13 ± 0.74	3.72 - 4.54	
Sig bet period	P$_1$< 0.001*, P$_2$ <0.001*, P$_3$ <0.009*		

*P value was considered significant if < 0.05. CI, confidence interval. P$_a$-value for comparing between group at baseline and 1,2,3 and 6 months after application of PRP. Sig bet periods were done using post hoc test [Bonferroni] for ANOVA with repeated measures. P$_1$: P-value for comparing between pre and 3 months after treatment. P$_2$: P-value for comparing between pre and 6 months after treatment. P$_3$: P-value for comparing between 3 and 6 months after treatment. Data expressed as mean ± SD.
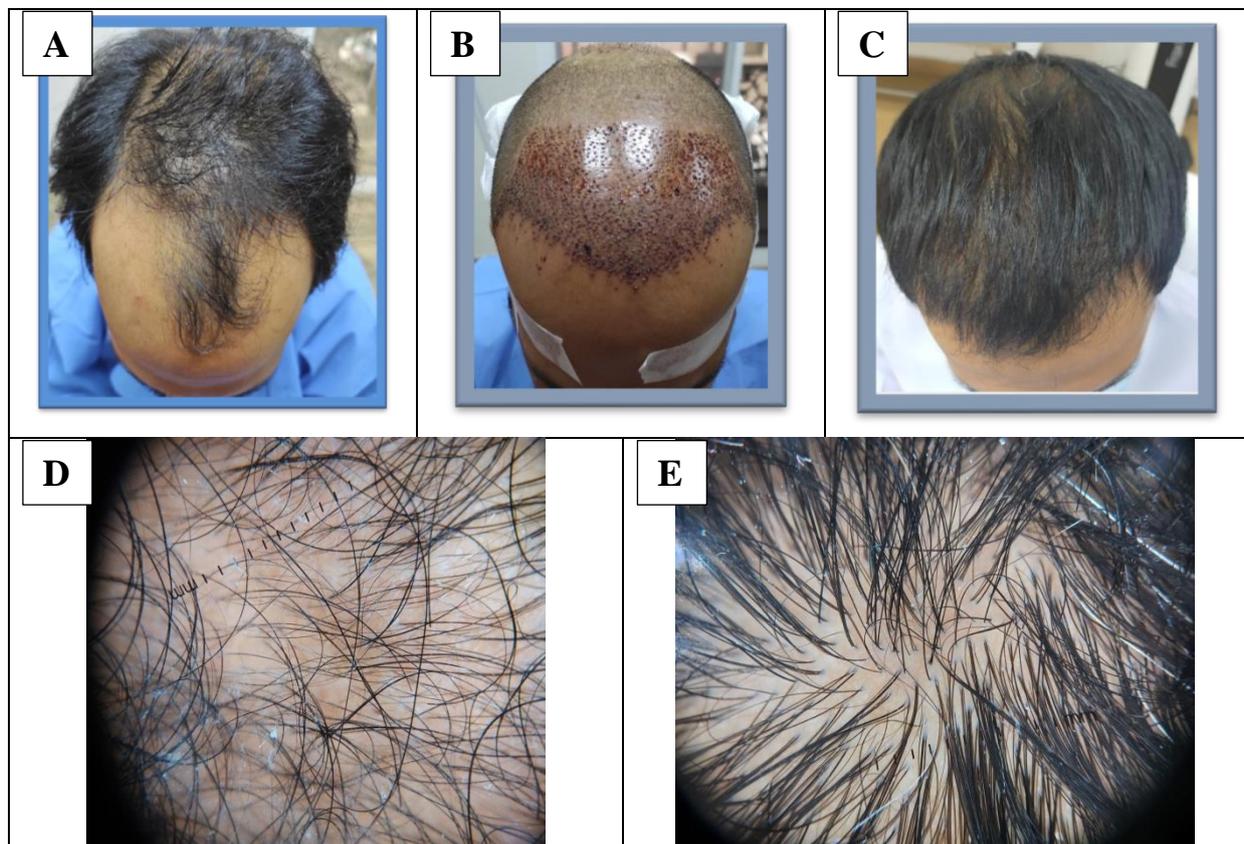

Figure [5]: Male patient 35 years old presented with AGA and treated by FUE plus PRP;
A] Preoperative, B] Intraoperative, C] 6 months postoperative, D] Trichoscopy before treatment,
E] Trichoscopy after 6 months of treatment
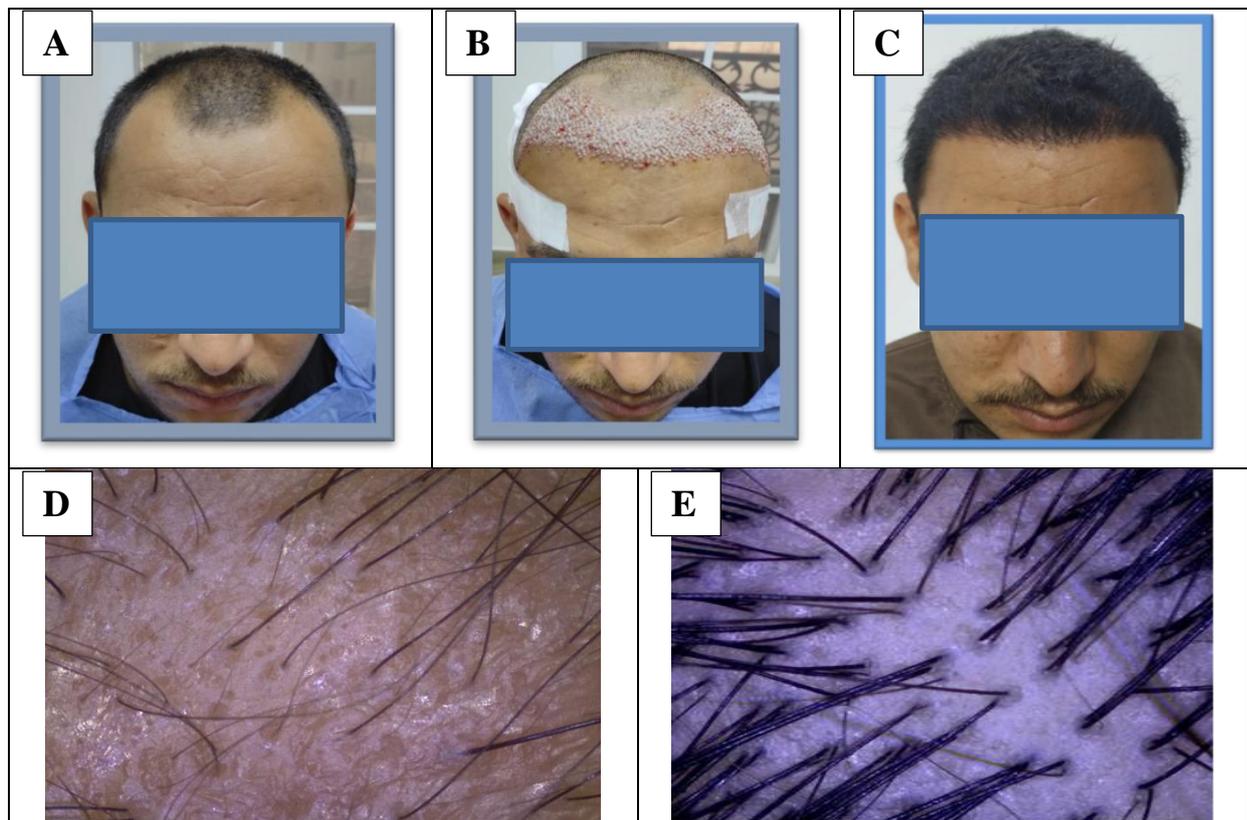
Figure [6]: Male patient 43 years old presented with AGA and treated by FUE plus PRP;
A] Preoperative, B] Intraoperative, C] Six months postoperative, D] Trichoscopy before treatment,
E] Trichoscopy after 6 months of treatment

DISCUSSION

Androgenetic alopecia is a common hair loss disorder affecting up to 80% of males by the age of 80. FUE has become the gold standard for surgical management of AGA. Medical treatment can be used in conjunction with surgery to achieve a synergistic effect [1].

Our study included 15 patients with androgenetic alopecia and candidate for hair transplantation, they were subjected to PRP injection after hair transplantation. Most of cases that included in our study were in adult and old age, which go in accordance with **Giordano et al.** [7] study that reported up to 30% of men over the age of 30 and 50% of men over the age of 50 may be affected by AGA.

Our study goes in accordance with **Varman et al.** [8] that reported the hair fall was found to be more [p=0.017] among urban with higher socioeconomic status [Class I and Class II] and awareness of hair transplantation was present among 55.5% of the study subjects.

In our study, the Hair shaft length and follicular density showed significant increasing in the mean of follicular density during the 1st,

2nd, 3rd and 6th month respectively with p-value <0.001 from baseline point in accordance with **Alves and Grimalt** [9] study that found the mean total hair density was significantly increased in PRP versus placebo-treated areas [p < 0.05].

As previously observed, **Sharma et al.** [10] reported that the follicular density in terms of FUGs/cm2 in the PRP versus non PRP group showed a non-significant difference from one month up to three months; however, after 6 months we found a pronounced significant difference between both groups. In addition, **Abdelkader et al.** [3] has also shown that pretreatment preservation of hair transplants in PRP rather than saline before to implantation results in increased hair density, graft uptake, and hair thickness. **Garg et al.** [5] studied the outcome of intra-operative injected PRP therapy during follicular unit extraction hair transplantation for 40 patients where he observed that there is increase in hair length >10 mm in the first three months in most of patients treated with PRP rather than control group. This may be explained by what reported of using [PRP] during and after hair transplant surgery has the potential to act as a bio stimulus to the transplanted hair. PRP is a rich source of anagen-maintaining factors, such as insulin-like

growth factor 1 [IGF-1], basic fibroblast growth factor [bFGF], and vascular endothelial growth factor [VEGF]. Injection of PRP has been demonstrated to improve cutaneous ischemic conditions and to increase vascular structures around hair follicles [11].

We did not find scalp redness, which goes in agreement with **Garg et al.** [5] that reported after four weeks, PRP treated group had showed redness of scalp in recipient area whereas only 70% in control group, 3 months later 5% only of PRP treated group had showed scalp redness that resolved completely after 6 month, whereas scalp redness persist in control group. This explained by **Ray and Sharma** [4] who reported that; platelet application of PRP may induce healing of recipient area by increasing growth of cells and neovascular formation and decreasing apoptosis that lead to improvement of the environment to newly transplanted grafts [12]. Furthermore, it contains significant amounts of PDGF, epidermal growth factor, transforming growth factor, fibroblast growth factor [FGF], and vascular endothelial growth factor [13].

Hair transplantation is a less invasive surgery with minor complications, in the form of ingrowing hair. The two most important factors in the success of FUE are accuracy and speed which come with time and practice. Unlike strip technique [FUT], graft harvesting in FUE is a blind procedure, and hence, injury to the grafts during punching is common, transection or physical injury to the grafts is a major drawback of FUE when compared to FUT which is one of the major reasons of failure of grafts [10].

Finally, **Kumaresan and Subburathinam** [14] reported that PRP for patterned hair loss is an autologous, effective, and straightforward therapy method with a low cost to benefit ratio and little morbidity. To speed up hair regrowth and improve patient compliance, PRP should be made available to all alopecic patients as part of the cafeteria strategy.

Conclusion: PRP treatment's positive effects on the quantity and quality of hair that grows back after hair transplantation include faster density, reduce catagen loss ratio of the transplanted follicles, rapid skin healing, and faster growth of new anagen follicles in FUE transplant recipients.

Conflict of Interest and Financial Disclosure: None.

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