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Clinical and Dermoscopic assessment of the therapeutic efficacy of platelet rich plasma and triamcinolone acetonide intralesional injections in alopecia areata

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Abstract

Background: Alopecia areata (AA) is a nonscarring patchy area of hair loss involving the scalp and/or body without any signs of inflammation. Platelets rich plasma (PRP)with its autologous supply of millions of growth factors is a simple, cost-effective and feasible treatment option in AA serving as an elixir for hair growth. Dermo scopy is a diagnostic tool which can overcome the refractive properties of stratum corneum by interface medium or cross polarization such that the lesion can be easily seen.

Aims and objectives: To evaluate the therapeutic efficacy of intralesional injections of Platelet rich plasma and Triamcinolone acetonide in AA both clinically and dermoscopically.

Materials and methods: A hospital based randomized controlled comparative study from January 2021 to August 2022 was conducted at Department of DVL, Government general hospital, Guntur.

Results: Out of 30 patients with AA studied with a total of 62 patches, there were 30 patches in PRP group and 32 patches in ILS group. The poor prognostic factors observed were atopic history, family history of AA, past history of AA, history of stress and nail changes. Yellow dots (92.5%) were found to be the most common Dermoscopic parameter followed by black dots (86.8%), broken hair (79.2%) and tapering hair (64.2%). Both

groups showed similar efficacy in clearing the yellow dots; however, grade 4 response in yellow dots was seen in 78.4% of PRP group and 71.4% of ILS group at the end of the study. PRP group and ILS group did not show any significant difference in response clinically as well as dermoscopically. Side effects were more commonly seen in those belonged to ILS group as compared to PRP group. Dermoscopy was useful in identifying the response early compared to clinical monitoring.

Conclusion: Platelets rich plasma is a promising and safe therapeutic option in AA. The diagnosis and follow-up are made easy owing to the unique Dermoscopic findings in each type of AA.

Keywords: Alopecia areata, platelet rich plasma, intralesional steroids, dermoscopy.

Introduction

Alopecia areata (AA), a scalp and/or body-related T-cell mediated organ-specific autoimmune disease that is characterized by patches of hair loss without any outward indications of clinical inflammation [1,2]. Treatment is difficult, despite the fact that the majority of existing medicines are immunosuppressive, as none of them are curative or preventative. In the treatment of alopecia areata, intralesional corticosteroids are frequently employed [3]. However, due to the drug's systemic absorption, intralesional steroid injections are linked to a number of side effects [3], including regional skin and hair follicle atrophy, telangiectasias, hypopigmentation, and cushingoid characteristics [4].

Platelet Rich Plasma (PRP), Platelet derived growth factor (PDGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF), Insulin-like growth factor (IGF), etc. were some of the growth factors that grabbed the attention of plastic surgeons and dermatologists. PRP can be considered a good adjuvant treatment technique for androgenic alopecia and other non-scarring alopecias since it is a straightforward, affordable, and practicable therapeutic option for hair loss with high patient satisfaction. In this study, intralesional triamcinolone injections and PRP therapy were assessed for their efficacy in treating AA patients.

On a clinical examination, it can be challenging to determine the activity and severity of AA with the naked eye. A non-invasive in-vivo technique called dermoscopy, often referred to as epilumini scence microscopy or skin surface microscopy or tricho scopy, is most frequently used to evaluate pigmented skin lesions and hair [5].

Tricho scopy in addition to identifying alopecia, has the potential to avoid needless biopsies. It is also a useful technique for photographically assessing the therapy response at each follow-up. Tricho scopy was employed in this study as a diagnostic technique for recording, record-keeping, and comparison with pre-treatment photos, which aid in evaluating therapeutic response earlier that would not be possible with naked eye examination.

Materials and methods

A hospital based randomized controlled comparative study was conducted for a period of 20 months from January 2021 to August 2022 at the Department of DVL, Guntur Medical College, Guntur, Andhra Pradesh. After obtaining clearance and approval from the Institutional Ethics Committee, 30 patients diagnosed with alopecia areata were chosen and enrolled for the study.

All patients were explained about the purpose of study, investigations and procedure involved. Detailed history, thorough examination of patches was conducted in each case and was recorded on a pre-structured proforma. Routine and other relevant investigations were carried

out. Evaluation of hair loss and treatment response was determined using Hair regrowth scale (HRS) and Severity of Alopecia Tool score (SALT- Score).

Procedure

Out of 30 patients,15 patients were randomly allocated into each group of PRP and ILS. Each group received 4 injections, one at baseline, at 4thweek, at 8th week and12th week under aseptic conditions. In each patch 0.1 mL of PRP or ILS (Triamcinolone acetonide 10mg/mL) are injected at 0.5 to 1cm intervals in the deep dermal/upper subcutaneous plane using a 0.5-inch-long 30-gauge needle fitted to insulin syringe. Injection site was treated with topical an aesthetic medication (combination of lidocaine and prilocaine) for a period of 40 minutes prior to the injections. The two modalities of treatment were followed up at 4th, 8th and 12thweek.

Preparation of Autologous Platelet-Rich Plasma (PRP)

PRP was prepared using double centrifugation method, where 20ml of whole blood was drawn from each subject by venipuncture of antecubital vein using 2 sterile vacutainers coated with sodium citrate (anticoagulant). Initially whole blood was centrifuged (2400 rpm for a period of 10 minutes) so as to separate PRP and platelet-poor plasma (PPP) portions from red blood cell fraction. PRP and PPP portions were again centrifuged (3600 rpm over a period of 15 minutes) in order to separate the PRP (1ml) from PPP. PRP was activated 5 minutes before injection using commercially available 10% calcium gluconate injection in 1: 10 ratios.

The response was assessed both clinically and dermoscopically by hair regrowth scale (HRS) and Severity of alopecia tool score (SALT Score)- scalp is divided into the following 4 areas: Vertex, 40%-(0.4), Right profile of scalp, 18% (0.18), Left profile of scalp, 18% (0.18), Posterior aspect of scalp, 24% (0.24). Percentage of hair loss in each area will be determined independently and will be multiplied by the percentage of scalp covered in that area. SALT score is the sum of percentage of hair loss in all the above-mentioned areas.

Collected data was analyzed by frequency, percentage, mean, median, standard deviation and by tests such as Friedman test, Mann Whitney U test and Chi square test.

Results

A total of 30 patients were included in the study, of which 15 were treated with triamcinolone injections and 15 were treated with PRP injections. The manage of the subjects in our study was 25.20 years. Maximum numbers of patients with alopecia areata were in the age group of 19-40 years. P value was 0.78, which was not significant hence age wise both PRP and ILS groups were matched. Males constituted 60% of the study population and male to female ratio was about 1.5:1.P value is 0.426 and there was no significant difference between both groups.

Table 1: Response at the end of 12 WEEKS in both ILS and PRP groups

Response	BD3		YD3		BH3		TH3	
Grades	PRP	ILS	PRP	ILS	PRP	ILS	PRP	ILS
0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
1	1 4%	0 0%	0 0%	0 0%	0 0%	0 0%	1 7.2%	0 0%

2	0 0%	1 3.7%	2 7.2%	4 14.2%	2 8.7%	3 11.5%	1 7.2%	0 0%
3	2 16%	6 22.2%	4 14.2%	4 14.2%	2 8.7%	4 15.3%	2 14.2%	3 17.7%
4	22 88%	20 74.1%	22 78.6%	20 71.6%	19 82.6%	19 73.2%	10 71.4%	14 82.3%

BD-Black dots, YD-Yellow dots, BH-Broken hair, TH-Tapering hair

The duration of the disease was less than 3 months in 43.3% of the patients. Regarding prognostic factors past history of AA was seen in 2 patients (13.3%) of PRP group and of ILS group. History of atopy was present in 3 patients (20%) in PRP group and 2 patients of ILS group (13.3%). Five patients (33.3%) in PRP group and four patients in ILS group (26.7%) had history of stress. Out of the 62 patches studies, 46.7% showed 2 patches and 30% had 3 patches.

Yellow dots (90.3%) were the most common Dermoscopic parameter observed followed by black dots (83.8%), broken hair (79.1%) and tapering hair (50%)

The mean SALT score or percentage of involvement of scalp was 5.68(SD-3.62). 100% of patients from both the groups showed grade IV improvement at the end of 12 weeks. There was no significant difference in response between the two groups in all three follow-ups. At the completion of study, treatment response was better in PRP group than triamcinolone group, but this difference was statistically insignificant (p=0.8017).

Table 2: Mean Salt score difference in PRP and ILS groups

Difference in SALT score at each visit with respect to baseline	PRP Group (Mean ± SD)	ILS Group (Mean ± SD)	P VALUE
Baseline- 4 weeks	1.39 ± 1.12	1.38 ± 1.31	0.9822
Baseline- 8 weeks	3.36 ± 4.18	3.27 ± 4.42	0.9547
Baseline - 12 weeks	6.63 ± 5.64	6.10 ± 5.81	0.8017

SD-Standard deviation

Figure 1

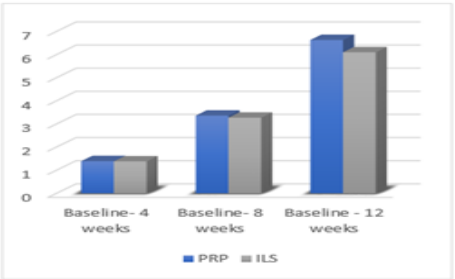


Fig 1A: Mean SALT score difference in PRP and ILS groups

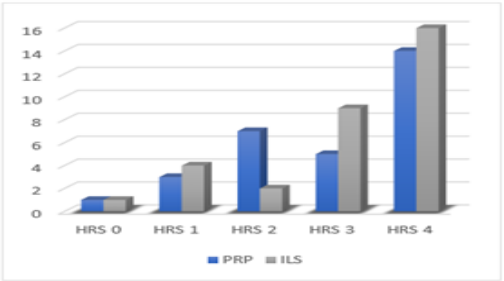


Fig 1B: Hair Regrowth Scale During 3rd Follow Up

Fig. 2: Dermoscopic findings observed

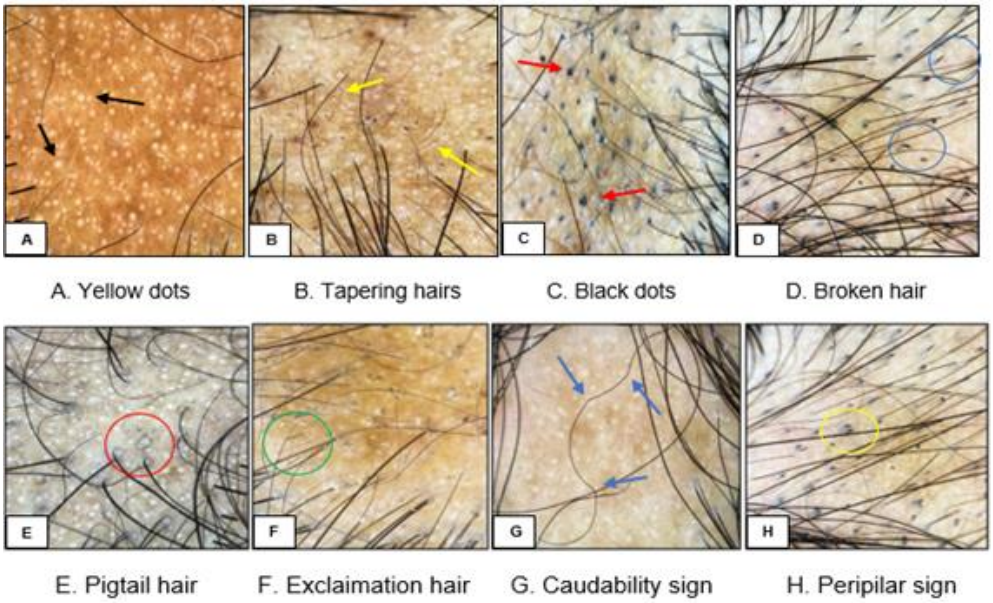
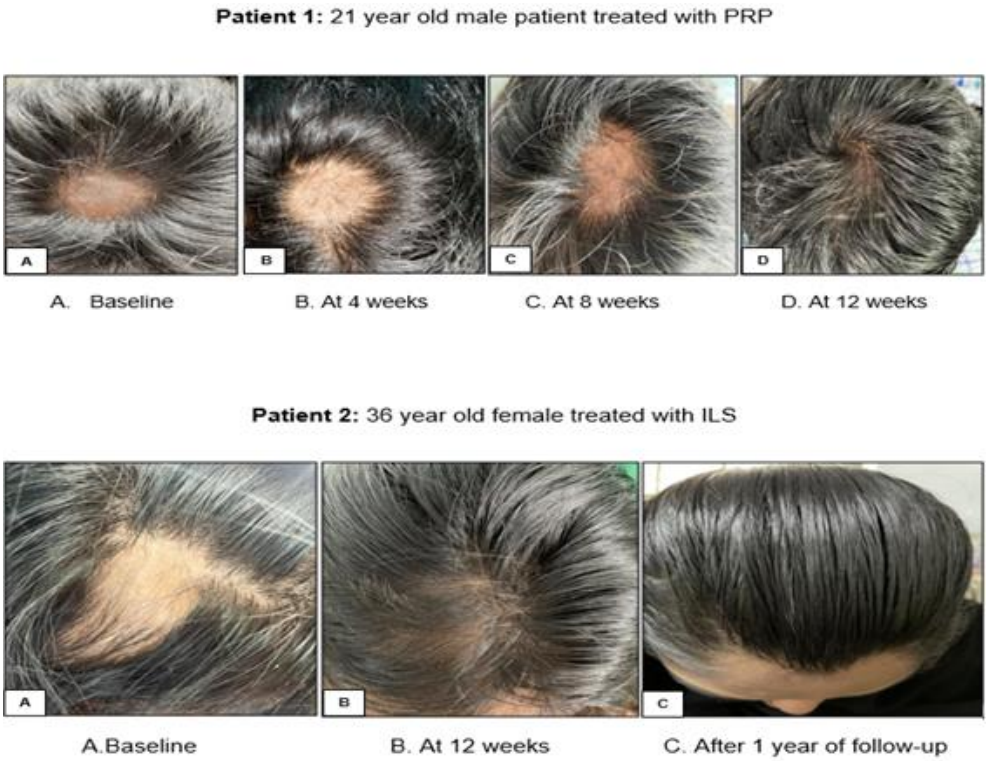


Fig 3: Treatment response with PRP and ILS



The comparison of overall improvement between groups using HRS Scale, was nonsignificant (p=0.114) with slight preponderance of grade 3&4 responses in PRP group in 4th, 8th week and in ILS group in 12th week.

With regard to side effect profile, ILS group had atrophy in 3 patients (20%), hypopigmentation in 2 patients (13.3%) and telangiectasia in 4 patients (26.6%). Whereas none of these side effects were observed in PRP group. However, pain at injection site was more commonly present in PRP group (33.3%) as compared to ILS group (20%).

Discussion

AA is considered an organ-specific autoimmune disease, stemming from loss of hair follicle's (HFs) immune privilege, therefore therapies are mostly immuno suppressive. Nevertheless, treatment is still a challenge in AA and no treatment is either curative or preventive. Apart from PRP and ILS, other commonly used therapies include topical minoxidil, anthralin, immunotherapy, topical &/or systemic steroids, cyclosporin, PUVA (Psoralen-Ultra violet-A) with variable success rates.

Recently intralesional corticosteroids have emerged as the most popular drugs available for the treatment of AA, especially in patients with less than 50% hair loss [6]. Usually, steroids with low solubility are preferred due to their slow rate of absorption from the injection site. In addition to this, the dosage or strength used varies among practitioners and the efficacy and safety of alternate doses of intralesional steroids has never been examined in a well-designed randomized controlled study.

In the current study majority of patients were young and most of them were between the age of 19 - 30 years (44%) and 31- 40 years (34%). These results were comparable to a study done by Sharma in North India. Panda et al reported 97%of their patients are less than 40 years of age. According to study conducted by M. Harries et al, AA incidence peaked at age 25–29 years in both males and females [7].

Out of the 30 Patients studied, most were males (60%) and male - female ratio was 3:2 which coincided with the study done by Ganjoo and Thappa. In a study by Asim Kumar et al [8]. 80% were males and 20% were females. We found no significant differences in age and sex distribution between the two groups studied.

Duration of hair loss is an important factor that determines the response to treatment. Longer duration of hair loss is associated with poor response to treatment. In majority of our patients the duration of hair loss was less than six months. This was similar to71% and 74% of the patients reported within 6 months in the studies by R L Sharma et al and Shumej et al respectively.

In the present study, history of atopy was seen in 16% of patients which was similar to the findings in study by R L Sharma and Panda et al, where Atopy was the most common condition observed in 10 % cases followed by lichen planus and vitiligo [9]. History of stress was observed in 30% of patients in this study, while in a study by Shumej et al, 13.51% were reported to have history of stress.

In present study 2 patients (8%) had positive family history of AA. Earlier studies by Peter et al and Mane et al showed a similar incidence of 14% and 10% respectively, but Tan et al and Pooja Agrawal et al have observed family history of AA in only 4.6% and 3.3% of cases respectively.

Past history of AA, positive family history and presence of nail changes are associated with poor prognosis. In the current study, majority of patients presented with the first episode of AA. Past history of AA was seen in 12% of patients. In a study by Ranpariya RH et al, past history of AA patch was observed in 33.33% of patients.

Nail changes were seen in 4 (14%) patients, out of whom 4 patients (16%) showed pitting and 3 patients (8%) showed ridging. Of them pitting was most common finding seen. This was similar to a study done by R L Sharma et al and Pooja Agrawal et al where pitting of nails was commonest pattern followed by longitudinal ridging and nail dystrophy where the latter was found to be the least common finding.

In this study, 17.5% cases had an association with thyroid dysfunction, of which all of them were found to be hypothyroid. Studies done by Peter et al, Kasumagic-Halilovic et al found thyroid dysfunction in 7% and 11.4% of their cases respectively. In the current study, 12.5% cases had a positive history of association with other auto-immune diseases. These frequencies were similar to the earlier studies. Association with vitiligo was 4.1% in a study done by Tan et al.

In the current study, most affected area was the occipital region as compared to other regions. This is similar to findings from a study by Shumej et al where occiput involvement was 27.27%. The most common distribution observed in AA is usually in the occipital and parietal regions as mentioned by Sharma et al. which was partly similar with the findings mentioned by Priya Kapoor et al where occiput (45%) was the most common site followed by vertex (27.5%).

The baseline Dermoscopic parameters studied were black dots, yellow dots, broken hair and tapering hair. Disappearance of these findings was associated with clinical remission of AA. Yellow dots were the most common Dermoscopic parameter observed with occurrence of 92.5% among all the patches. The second most common parameter observed was black dots (86.8%), followed by broken hair (79.2%) and tapering hair (64.2%). These findings are similar to a study done by Ganjoo et al. except that tapering hair was present in a higher percentage of our patients [10].

Both the groups showed similar efficacy in clearing the yellow dots. However, at the end of study, grade 4 responses in yellow dots were seen in 78.4% of PRP group and 71.4% of ILS group. Yellow dots are most common and sensitive feature of AA.

In the current study mean SALT score decreased from 8.96 at baseline in Group A to 2.33 at the end of 12 weeks. Similarly, the mean SALT score in Group B decreased from 8.48 at baseline to 2.38 at the end of 12 weeks. The difference in distribution of SALT scores at each visit with respect to the base line in both groups was statistically significant.

These mean SALT scores are comparable with mean SALT scores or percentages of involvement of scalp of 5.945(SD-3.62) from the study by Shumej et al. In his study percentage of complete resolution (53.8%) was higher in PRP group than triamcinolone group (35.4%) at end of the 6th week.

In the present study 100% response to treatment in AA was observed in 48% of PRP and 52% of ILS groups. Abell and Munro reported that 52 of 84 patients (62%) 54showed regrowth of hair at 12 weeks after three intralesional injections of ILS. Similar results were obtained by Kuldeep et al in patients treated with TA [11].

In study by Rinaldi et al, it was found to increase hair regrowth and capillary density and decrease the number of dystrophic hair when compared to triamcinolone acetonide or placebo.

Shumez et al. treated 48 patients with triamcinolone injections and 26 patients with PRP injections. PRP treated patients had an earlier response at the end of 6 weeks, but the difference was statistically insignificant. Findings similar to the above study were observed in the current study.

In the present study, there were no major adverse effects with PRP treatment. This coincides with the study done by Singhal et al. In his study on treatment of androgenic alopecia in 10 Patients, he found that PRP had shown notable beneficial effects without any adverse reactions [12]

Conclusion

In this study, the efficacy of intralesional platelet rich plasma injections was assessed and compared to those of the triamcinolone acetonide. We observed yellow dots to be the most common Dermoscopic finding observed in AA, followed by black dots, broken hair and tapering hair. Disappearance of these findings was associated with clinical remission of AA. Grade 3 and 4 responses in Dermoscopic parameters were seen early in PRP group as compared to ILS group in the first two follow ups. At the end of study, both groups showed equal efficacy in clearing the Dermoscopic parameters however, side effects were more in the ILS group. The current study emphasizes on the meticulous usage of dermo scope in assessing various findings of AA. The results of this study further support the anti-inflammatory and hair growth promoting action of PRP in AA.

Ethical approval

Approval for the study was obtained from Institutional Ethics Committee, Guntur Medical College, Guntur, AP, India.

Consent

Written and informed consent was obtained from all participants of the study.

List of abbreviations

AA- Alopecia areata, PRP- Platelet rich plasma, ILS- Intralesional steroids, HRS- Hair regrowth scale, SALT- Severity of Alopecia Tool score, PDGF-Plasma derived growth factor, VEGF- Vascular endothelial growth factor, TGF-Transforming growth factor, IGF- Insulin like growth factor.

Data availability

Data related to the study is available upon request from the corresponding author.

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Authors' contributions

NP collected, analysed and interpreted the data. MR supervised and guided at all stages.

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