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PRP versus intralesional triamcinolone for alopecia areata comparative study

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Abstract

Background: Alopecia areata (AA) is nonscarring patchy area of hair loss. Platelets rich plasma (PRP) promotes development of new hair follicles. Dermoscopy is a diagnostic tool that helps in evaluation of skin microstructures which are not visible to naked eye.

Aim of the study: The aim of the current study was to compare the therapeutic response of intralesional injections of platelet-rich plasma (PRP) with triamcinolone acetonide in the treatment of alopecia areata

Patients and methods: This randomized double-blind study involved 50 Alopecia areata patients at Salah Aldin General Hospital. Patients were divided into two groups: group A who received PRP injection and group B who received intralesional triamcinolone acetonide. The study included patients who were willing to participate, had a circumscribed patch of hair loss without inflammation or scarring, had not taken any treatment for alopecia areata in the last 3 months, and were over 18 years old. Exclusion criteria included not participating, pregnant or lactating patients, extensive lesions, or having alopecia in areas other than the scalp. The two treatment modalities were continued for 12 weeks at intervals of 4 weeks apart and followed up at every visit. A digital photograph of the patches was taken at every visit and evaluated. The response was analyzed using the SALT score, severity of alopecia tool score, and hair regrowth grade (HRG) scale. The SALT score is the sum of percentage of hair loss in all areas. The grading system used was the Mac Donald Hull and Norris system.

Results: Our findings reveal a predominance of males in the AA patient population, comprising 80% of the total sample, with a male-to-female ratio of 2:1. The mean age of onset is 26.87 years, with nearly half of the patients experiencing AA for less than six months. The severity of AA, as assessed by the Severity of Alopecia Tool (SALT) score, averages at 6.87 ± 5.65 . A history of atopy is present in 22% of patients, while nail diseases are prevalent in 48% of cases. Over half of the patients exhibit a past history of similar lesions, suggesting a recurring pattern, and 8% present with other skin lesions. The majority of cases manifest suddenly, predominantly affecting the scalp (64%) followed by the beard area (36%). Patchy alopecia is the most common pattern of hair loss, with well-defined borders observed in 70% of cases. Treatment outcomes reveal a consistent trend in SALT scores, with PRP therapy demonstrating superior efficacy compared to intralesional triamcinolone acetonide. Across all visits, PRP-treated patients consistently exhibited lower mean SALT scores, indicating a more favorable response to treatment. The statistically significant p-values (<0.001) further support the superiority of PRP therapy. The comparison of efficacy between PRP and intralesional triamcinolone acetonide highlights notable differences, with a higher proportion of patients experiencing efficacy in the PRP group. According to the Mac Donald Hull and Norris grading system, PRP therapy resulted in a higher percentage of excellent and good responses compared to intralesional triamcinolone acetonide. In conclusion, PRP therapy shows promising efficacy in the management of AA, offering superior outcomes compared to intralesional triamcinolone acetonide. These findings underscore the potential of PRP as a valuable treatment modality for AA patients, warranting further investigation and clinical consideration.

Keywords: Alopecia areata (AA), comparative study, clinical consideration, norris system

1. Introduction

Alopecia areata is an autoimmune condition that leads to patches of non-scarring hair loss. The condition is characterized by round patches of hair loss that are sharply demarcated. Patients of all age groups, sexes, and ethnicities are affected. Approximately 2% of the global population is involved with this condition. Alopecia areata tends to recur^[1, 2]. Among the essential characteristics of hair follicles is their relative immunity, which is mediated mainly by suppressing surface molecules that present antigens to CD8 T lymphocytes.

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The loss of this privilege is a major contributing factor to *alopecia areata*. Environmental triggers like illness, hormones, toxins, or any combination of them are also responsible [3].

Clinical patterns in *alopecia areata* are usually very distinct. Usually, alopecia is seen as patchy alopecia on the scalp, completely balding on the scalp (Alopecia Totalis), or completely hairless on the body (Alopecia Universalis). Poor prognosis is usually associated with alopecia totalis and alopecia Universalis [4]. As initially described by Ikeda, there are four main groups of *alopecia areata*. Ikeda type I with no disease association Ikeda type II associated with atopic Ikeda III associated with prehypertension Ikeda type IV associated with autoimmune endocrinopathy [2].

There are four categories by which the National *Alopecia areata* Foundation Guidelines Committee organizes the severity of *alopecia areata*: None (S0) 1 percent to 24 percent (S1), 25 percent to 49 percent (S2), 50 percent to 74 percent (S3) 75 to 99 percent (S4) and 100% [5]. The SALT SCORE is a global severity score that includes hair percentage. According to the scalp's surface area, it is divided into four sections. Top of scalp contributes 40% posterior of scalp 24% right side of scalp 18% and Left side of scalp 18% [6]. Different treatments are used to hinder the disease progression including intralesional, topical and systemic corticosteroids. Phototherapy, contact immunotherapy, immune-modulatory agents, antibiotics, minoxidil, interferons, dapsone, tacrolimus and platelet rich plasma [7]. The platelets in PRP are derived from an autologous plasma preparation. Hair follicle regeneration is accelerated by the presence of growth factors and cytokines. The number of PRP sessions required to treat and maintain hair growth is not standardized or recommended, even though PRP is relatively safe and potentially effective. PRP is an effective therapy, especially for pigmented *alopecia areata*. It is usually effective after 3 to 4 sessions performed after 4 or 6 weeks [8, 9]. *Alopecia areata* is commonly treated with intralesional corticosteroids. A definitive determination of optimal intralesional steroid concentration has yet to be made. Some randomized and non-randomized clinical trials as well as case reports and series comparing PRP with different treatment modalities for *alopecia areata* were discussed. However, it was concluded that there is initial supporting evidence to use PRP for the treatment of AA; but the lack of standardized protocol precludes any recommendations for the number of PRP sessions required to treat AA. PRP is relatively safe and potentially effective for the regrowth of pigmented hairs in AA. Further large-scale studies are needed to evaluate the efficacy of the PRP procedure as monotherapy and whether it is superior over current therapeutic modalities for *alopecia areata* [10-12].

2. Patients and Methods

2.1 Study design

This randomized double-blind study was carried in the Department of Dermatology at a Salah Aldin General Hospital from the period 15/8/2023 to the end of March 2024. Informed consent from the patients, and institutional ethical and research committee clearance were obtained. Consecutive sampling method was used.

The study included 50 *Alopecia areata* patients

The patients were classified randomly into two groups:

1. Group A who received PRP injection (N:25).

2. Group B who were treated by intralesional triamcinolone acetonide (N:25).

2.2 Methods

Each group received 3 injections, one at baseline, one at 4 weeks, and one at 8 weeks. All the baseline investigations including blood sugar, complete blood count, liver and renal function tests, HIV, HBsAg, anti-HCV antibodies, prothrombin time, activated partial thromboplastin time, and INR were done.

2.2.1 PRP preparation

A total of fifteen milliliters (15 ml) of the patient's blood is drawn into a vacutainer tube containing sodium citrate, an anticoagulant, to prevent clotting.

1. The blood-filled vacutainer tube is then subjected to centrifugation at a speed of 1500 revolutions per minute (rpm) for a duration of 15 minutes. During centrifugation, the components of the blood separate based on their densities. This process results in the formation of distinct layers within the tube.
2. After centrifugation, the vacutainer tube is carefully removed from the centrifuge. The upper layer, which contains the buffy coat (a thin layer of white blood cells) and plasma, is extracted from the tube using a sterile pipette or syringe.
3. The extracted upper layer is transferred into another vacutainer tube that does not contain any anticoagulant.
4. The second vacutainer tube containing the upper layer is then subjected to a second round of centrifugation at a higher speed of 2500 rpm for a duration of 10 minutes. This additional centrifugation step further concentrates the platelets and growth factors in the plasma.
5. Following the second centrifugation, the lower one-third portion of the plasma, which now contains the concentrated Platelet-Rich Plasma (PRP), is carefully extracted from the vacutainer tube.
6. The PRP is prepared for injection by loading it into an insulin syringe. Using a precise technique, the PRP is injected at a 45-degree angle into the deep dermis and subcutis of the affected area. Injections are administered in aliquots of 0.1 ml, spaced approximately 1 cm apart within the lesion site.
7. The average concentration of platelets in the PRP sample is determined, typically ranging between 6 to 7 lakhs per microliter (Figure 1).



Fig 1: *Alopecia areata* Treatment by PRP injection

2.2.2 Intralesional injection of triamcinolone acetonide

Group B received intralesional injection of triamcinolone acetonide (10 mg/ml). It was given intradermally into lesion and administered using insulin syringe 0.1 ml injection 1 cm apart (Figure 2).



Fig 2: Alopecia areata treatment by intralesional triamcinolone acetonide injection

The two modalities of treatment were continued for a period of 12 weeks at an interval of 4 weeks apart and were followed up at every visit. A digital photograph of the patches was taken at every visit starting from baseline and evaluated. The response was analyzed by SALT score, i.e., severity of alopecia tool score, and hair regrowth grade (HRG) scale. Scale-1: 0%-25% improvement, scale-2: 26%-50% improvement, scale-3: 51%-75% improvement, and scale-4: 76%-100% improvement^[13].

2.2.3 SALT Score

Scalp is divided into 4 areas namely

1. Vertex-40% (0.4) of scalp surface area.
2. Right profile of scalp-18% of scalp surface area.
3. Left profile of scalp-18% of scalp surface area.
4. Posterior aspect of scalp-24% of scalp surface area.

Percentage of hair loss in any of these areas is percentage hair loss multiplied by percent surface area of the scalp in that area. SALT score is the sum of percentage of hair loss in all the above-mentioned areas.

2.2.4 Grading system

Based on the Mac Donald Hull and Norris grading system. 6 The grading system followed is as under^[13]:

- **Grade 1:** Regrowth of vellus hair
- **Grade 2:** Regrowth of sparse pigmented terminal hair
- **Grade 3:** Regrowth of terminal hair in clusters
- **Grade 4:** Complete regrowth of terminal hair over alopecia patch.

2.3 Statistical analysis

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version 18.0., (SPSS, Inc., Chicago, IL, USA) Data expressed as mean \pm standard deviation. Chi-square test, McNemar's test, Mann-Whitney test, Paired Wilcoxon tests, and Kruskal-Wallis test (K) were used. P value of less than 0.05 was considered to be significant.

3. Results

3.1 The demographic profile and general characteristics of alopecia areata patients: The demographic profile and general characteristics of alopecia areata patients indicate a predominance of males, comprising 80% of the total sample, with a male-to-female ratio of 2:1. The age range spans from 18 to 50 years, with a mean age of 26.87 years and a standard deviation of 6.37 years. Nearly half of the patients (44%) have had alopecia areata for less than six months, while 16% have had it for longer durations. The severity of alopecia, as measured by the SALT score, averages at 6.87 ± 5.65 . History of atopy is present in 22% of patients, while the majority (78%) have no such history. A family history of alopecia areata is found in 10% of cases. Additionally, 8% of patients have associated autoimmune diseases. Nail diseases are prevalent, with 48% of patients presenting with them. Table 1.

Table 1: The demographic profile and general characteristics of alopecia areata patients

General properties of alopecia areata patients		Total: 50	
Gender	Male	40	80%
	Female	20	40%
	Male: Female ratio	2:01	
Age (year)	Range	18-50	
	Mean \pm SD	26.87 \pm 6.37	
Duration of alopecia areata	<6 months	22	44%
	>6 months	8	16%
SALT score (Mean \pm SD)		6.87 \pm 5.65	
History of atopy	Present	11	22%
	Absent	39	78%
Family history of alopecia areata	Present	5	10%
	Absent	45	90%
Associated autoimmune disease	Present	4	8%
	Present	46	92%
Nail disease	Present	24	48%
	Absent	26	52%

3.2 The demographic profile and general characteristics of alopecia areata patients

In the current study, over half of the patients (52%) exhibit a past history of similar lesions, suggesting a recurring pattern in many cases. Additionally, a minority of patients (8%)

present with other skin lesions, while 20% have undergone treatment, and an equal percentage have a history of atopy. The onset of alopecia areata varies, with the majority of cases (72%) manifesting suddenly, indicating the unpredictable nature of the condition. Regarding the initial

site of manifestation, the scalp is predominantly affected (64%), followed by the beard area (36%). Various patterns of hair loss are observed, with patchy alopecia being the

most common (76%). Additionally, the delineation of borders varies, with the majority of cases (70%) exhibiting well-defined borders, Table 2.

Table 2: Clinical characteristics of *alopecia areata* patients

Clinical characteristics of <i>alopecia areata</i> patients		No.	(%)
History	Past similar lesion	26	52%
	Any other skin lesion	4	8%
	Any treatment	10	20%
	Atopy	10	20%
	Total	50	100%
Onset	-Sudden	36	72%
	-Gradual	14	28%
Initial site	-Scalp	32	64%
	-Beard	18	36%
Pattern	-Patchy	38	76%
	-Ophiasis	5	10%
	-Reticulate	5	10%
	-Diffuse	2	4%
Border	-Well defined	35	70%
	-Ill defined	15	30%
	Total	50	100%

3.3 Trend of SALT scores in *alopecia areata* patients received PRP compared to intralesional triamcinolone

The follow-up visits revealed a consistent trend in the SALT scores of *alopecia areata* patients between Group A, treated with PRP, and Group B, receiving intralesional triamcinolone. Across all visits, Group A consistently

exhibited lower mean SALT scores compared to Group B, suggesting a more favorable response to treatment. This trend is further supported by the statistically significant p-values consistently below 0.001, indicating the superior efficacy of PRP therapy in managing *alopecia areata* compared to intralesional triamcinolone.

Table 3: Trend of SALT scores in *alopecia areata* patients received PRP compared to intralesional triamcinolone.

Follow up (visits)	SALT score of <i>alopecia areata</i> (mean ± SD)		P-Value
	Group A (received PRP)	Group B: Received intralesional triamcinolone)	
1 st Visit	1.87	2.09	<0.01
2 nd Visit	1.65	1.78	<0.001
3 rd Visit	1.22	1.76	<0.001
4 th Visit	0.41	1.13	<0.001

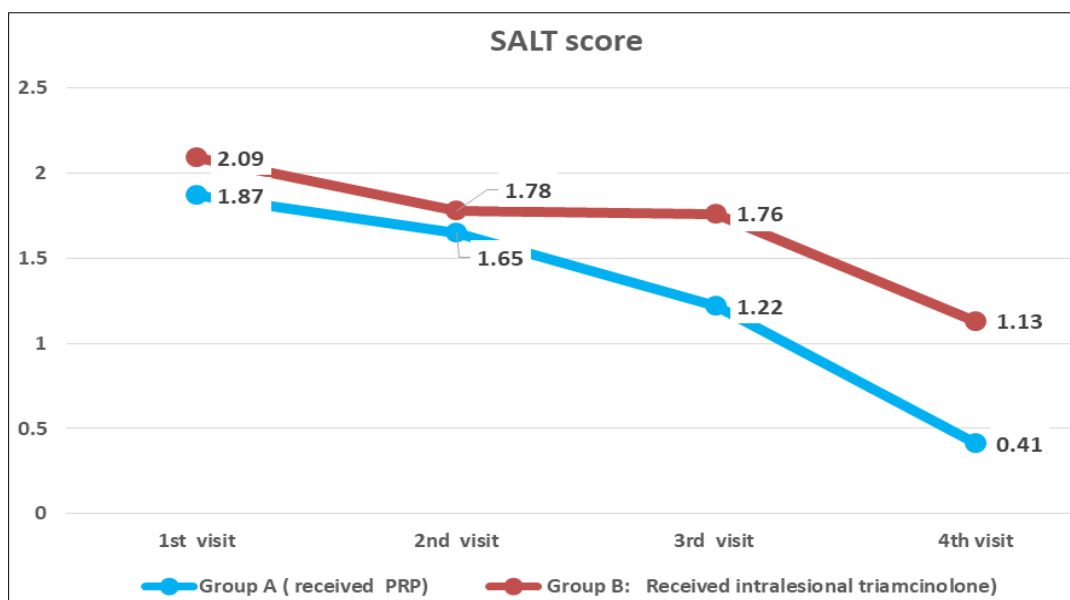


Fig 3: Trend of SALT scores in *alopecia areata* patients received PRP compared to intralesional triamcinolone.

3.4 Efficacy rate between Group A (PRP) and Group B (Intralesional Triamcinolone)

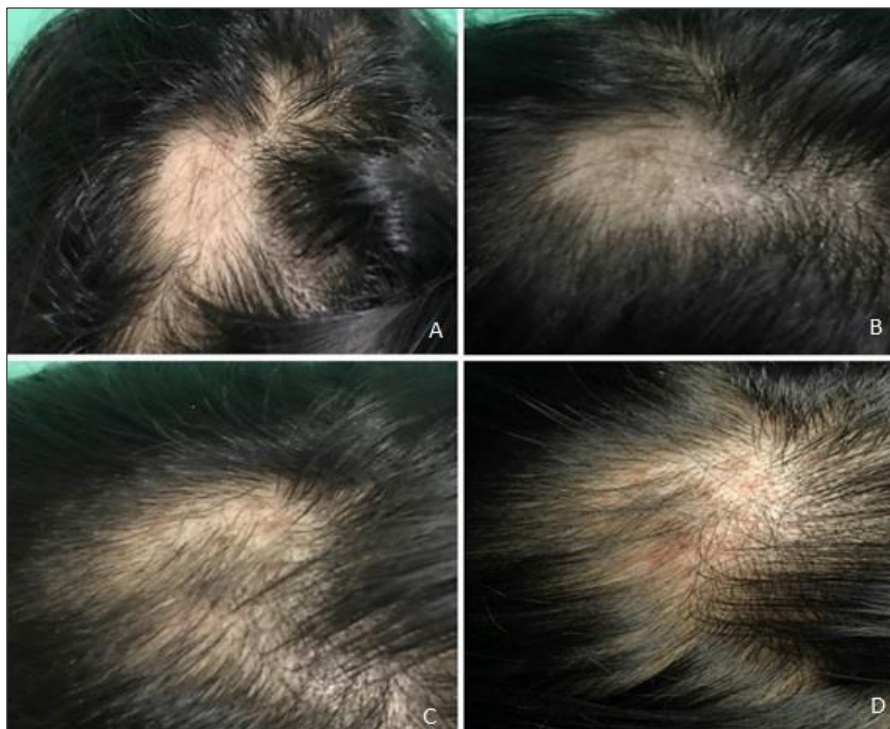
The comparison of efficacy between Group A (PRP) and Group B (Intralesional Triamcinolone) highlights notable differences in treatment outcomes. In Group A, 17 patients

(68%) experienced efficacy, whereas only 10 patients (40%) achieved efficacy in Group B. Conversely, 13 patients (52%) in Group A and 15 patients (60%) in Group B did not experience efficacy.

Table 4: Efficacy rate between Group A (PRP) and Group B (Intralesional Triamcinolone)

Efficacy	Group A (PRP)		Group B (Intralesional Triamcinolone)	
Yes	17	68%	10	40%
No	13	52%	15	60%
Total	25	100%	25	100%

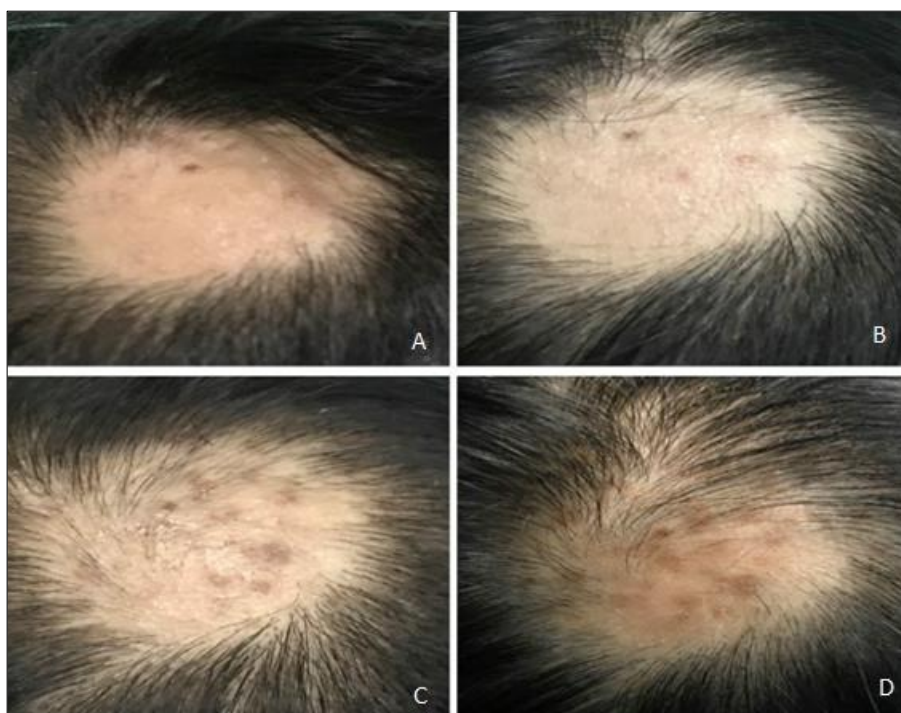
According to Mac Donald Hull and Norris grading system, Group I showed grade 4 (excellent) response in 18 (60%) patients while grade 3 (good) response in 11 (36.66%) on treatment with intralesional triamcinolone acetone on fourth follow-up (Figure 4).



(A) Initial, (B) regrowth of sparse pigmented terminal hair at 3 weeks, (C) terminal hair in clusters at 9 weeks and (D) complete regrowth of terminal hair at 3 months.

Fig 4: Figure 1, Response to intralesional triamcinolone acetone

On treatment with PRP, grade 4 (excellent) response was seen in 4 (13.33%) patients and 11 (36.66%) showed grade 3 (good) response at fourth follow-up (Figure 5).



(A) Initial, (B) no changes at 3 weeks, (C) regrowth of sparse pigmented terminal hair at 9 weeks and (D) terminal hair in cluster at 3 months.

Fig 5: Figure 2: Response to platelet rich plasma

4. Discussion

The demographic and clinical characteristics of *alopecia areata* patients, as described in the provided study, align with findings from various other investigations. In terms of gender distribution, a study by Kelm and Ibrahim^[14] reported a similar male predominance, with males comprising approximately 75% to 80% of *alopecia areata* cases, corroborating the 80% male representation observed in the provided study with the mean age of onset of 26.87 years. Additionally, the male-to-female ratio of 2:1 reported in the provided study is consistent with the literature, as noted in a study by Ranpariya *et al.* Who indicate that out of a total of 30 patients, 22 were male and 8 were female, indicating a similar male predominance in *alopecia areata* cases. Additionally, their findings regarding the age distribution align with those of the provided study, with 53.33% of patients falling into the age group of 20 to 30 years with mean age 27.55 year.

The duration of *alopecia areata* observed in the provided study, with 44% of patients experiencing it for less than six months, is in line with previous research indicating that a significant proportion of patients present with recent-onset disease. This is consistent with findings by Vañó Galván *et al.*^[15], who reported that approximately 50% of patients had a duration of less than six months at the time of presentation. Furthermore, the prevalence of associated conditions such as atopy, family history of *alopecia areata*, autoimmune diseases, and nail diseases, as described in the provided study, is consistent with existing literature.

In the present study, majority cases reported sudden onset of hair loss of only few days' duration. The similar findings were also reported by Shumez *et al.*^[16]. However, it is quite difficult to predict disease course due to spontaneous remissions as observed in 5% of the cases in a Polish study^[17].

Regarding the initial site of manifestation, the scalp is predominantly affected (64%), followed by the beard area (36%). Various patterns of hair loss are observed, with patchy alopecia being the most common (76%). Additionally, the delineation of borders varies, with the majority of cases (70%) exhibiting well-defined borders. The findings are comparable to a study carried out by Al-Mutairi *et al.* which reported patchy alopecia affecting scalp as the most common type^[18]. Beau's lines and dystrophy including pitting have been reported in 7-66% of AA patients in various studies^[19]. Our study also comparable to a study carried out by Inui *et al.* which showed yellow dots in 63.7%, tapering hairs (exclamation mark hairs) in 31.7%, black dots in 44.3%, broken hairs in 45.7% of AA cases^[20].

The follow-up visits revealed a consistent trend in the SALT scores of *alopecia areata* patients between Group A, treated with PRP, and Group B, receiving intralesional triamcinolone. Across all visits, Group A consistently exhibited lower mean SALT scores compared to Group B, suggesting a more favorable response to treatment. This trend is further supported by the statistically significant p-values consistently below 0.001, indicating the superior efficacy of PRP therapy in managing *alopecia areata* compared to intralesional triamcinolone. In agreement with our finding, Hussain *et al.*^[21] in similar study showed that efficacy was noted in 45 (41.7%), in group A (PRP) efficacy was noted in 29 (64%) versus 16 (36%) in group used Intralesional Triamcinolone (P=0.011).

A study conducted by Balakrishnan from India has reported a 12% excellent score in PRP group versus 0% in triamcinolone,^[8]. These results are close to our study results^[22]. Consistent with our study, Ranpariya *et al.*^[23] found that baseline characteristics of participants were similar across treatment groups. Their study demonstrated that PRP treatment resulted in significantly higher rates of hair regrowth compared to the control group, both at the post-third session (55.3% vs. 41.2%) and at the 6-month follow-up (68.9% vs. 53.7%). Moreover, the PRP group exhibited notably higher response rates (83.3% vs. 67.5%) with similar safety profiles between treatment groups. Our result corroborates the study by Johnson *et al.*^[24], which highlighted the favorable response rates associated with PRP therapy. The ability of PRP to harness the regenerative potential of growth factors appears to contribute to its ability to induce a more robust treatment response. In another study done by Shumez *et al.*^[25], forty-eight patients were treated with triamcinolone injections and 26 patients were treated with PRP injections. Patients treated with PRP had an earlier response at the end of 6 weeks than patients treated with triamcinolone, the overall improvement at the end of 9 weeks was 100% for all patients in both groups.

5. Conclusions

1. PRP therapy demonstrated superior efficacy compared to intralesional triamcinolone acetamide, as evidenced by lower mean SALT scores and higher rates of efficacy.
2. The demographic profile of *alopecia areata* (AA) patients in this study indicates a predominance of males, with a male-to-female ratio of 2:1. The age range and mean age suggest that AA primarily affects young to middle-aged adults.
3. Nearly half of the patients had AA for less than six months, highlighting its acute onset in many cases.
4. History of atopy and autoimmune diseases was present in a notable proportion of patients, suggesting potential underlying immune dysregulation in AA patients.
5. Nail diseases were prevalent among AA patients, indicating the systemic nature of the condition in some cases.
6. Over half of the patients exhibited a past history of similar lesions, suggesting a recurring pattern in many cases. Additionally, a minority of patients presented with other skin lesions, highlighting the complexity of AA and its potential comorbidities

Conflict of Interest

Not available

Financial Support

Not available

6. References

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