ORIGINAL ARTICLE

# A prospective interventional cohort study on the effectiveness of autologous platelet-rich plasma (PRP) as a treatment for stable vitiligo

**Thanuja Nawarathna**[1], **Janaka Akarawita**[1], **Nagapooshani Jeganathan**[1], **Kosala Weerakoon**[2]

[1]National Hospital of Sri Lanka, Colombo, Sri Lanka.
[2]Faculty of Medicine, Rajarata University of Sri Lanka.

**Correspondence:** Thanuja Nawarathna, thanujaniroshi85@gmail.com

## Abstract

**Background:** Vitiligo is a common autoimmune disease resulting in patchy depigmentation that can be cosmetically disabling. Conventional modalities often yield inconsistent results, leading to the emergence of autologous Platelet-Rich Plasma (PRP) as a safe, promising alternative. This study aimed to evaluate the effectiveness and safety of PRP as a therapeutic intervention for stable vitiligo, alongside assessing sociodemographic data, comorbidities, and patient satisfaction.

**Methods:** A prospective study included 22 patients with stable vitiligo (BSA ≤ 1%) at the National Hospital of Sri Lanka. Contralateral or similar lesions served as controls. Participants received intradermal PRP injections every four weeks for four sessions. Patients were monitored monthly during treatment and for three months post-therapy to evaluate repigmentation via VASI scores, lesion diameter, and side effects.

**Results:** The study population had a mean age of 37 years and a female preponderance (72.7%). Treated patches showed a statistically significant reduction in median diameter from 6.0 cm to 5.9 cm ($P = 0.002$) and median VASI score from 100 to 90 ($P = 0.008$). Conversely, control patches showed no significant changes. Reported complications included universal injection-site pain, with rare instances of numbness (4.5%) and bruising (4.5%). While 40% of patients were satisfied with the outcome, 59% were not.

**Conclusions:** PRP is a safe, moderately effective adjuvant treatment for stable vitiligo. Although statistically significant improvements occurred in lesion size and VASI scores, clinical benefits remain modest as monotherapy. PRP may hold greater potential when combined with established therapies like NB-UVB or fractional lasers. Further large-scale randomized studies are required to optimize protocols and long-term efficacy.

**Keywords:** vitiligo; platelet-rich plasma; autologous PRP therapy; Vitiligo Area Scoring Index (VASI); repigmentation

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## Introduction

Autoimmune dermatological disorders represent a significant proportion of patients attending dermatology clinics. Among these patients, vitiligo is a common autoimmune disease that progressively destroys melanocytes in the skin, resulting in patchy depigmentation.[1] The global prevalence of vitiligo is approximately 0.5 - 2%, with a reported prevalence of around 1.2% in local settings.[1,2] It affects both sexes equally and occurs at any age.[1] The aetiology of vitiligo is multifactorial, involving genetic susceptibility and environmental factors. Genome-wide association studies have identified multiple susceptibility loci, predominantly related to immune regulation, supporting a central role of immune-mediated mechanisms in disease pathogenesis.[1] The majority of these genes are immune genes involved in innate and adaptive immune responses, confirming a critical role of the immune system in the pathogenesis of vitiligo. Apart from the autoimmune hypothesis, several other hypotheses have been proposed to explain the pathogenesis of vitiligo, including neural and biochemical hypotheses.[1] Environmental exposures, including phenolic compounds in the household and occupational products, have also been implicated.[1]

Vitiligo is usually a clinical diagnosis supported by tools such as Wood's lamp examination and dermoscopy to delineate lesion extent and exclude differential diagnoses.[1] Clinically, it presents as well-defined depigmented macules and patches that may progressively increase in size and number, commonly affecting the face, extremities, and intertriginous regions.[1]

Disease classification includes localized and generalized forms; lesion stability, typically defined as the absence of progression over at least 12 months, is a key determinant of therapeutic decision-making.[1] Although not life-threatening, vitiligo is associated with a significant psychosocial burden and reduced quality of life.[1]

Conventional treatment modalities include topical and systemic immunosuppressive therapies, phototherapy, excimer laser, fractional CO2 laser, and several surgical techniques.[1] However, these approaches are limited by variable efficacy, potential adverse effects, and inconsistent patient response, highlighting the need for safer and more effective therapeutic alternatives, such as autologous Platelet Rich Plasma (PRP) therapy.

PRP has emerged as a potential therapeutic modality in dermatology, with reported benefits in conditions such as morphea, alopecia, acne scarring, and skin rejuvenation.[1] Literature confirms PRP as a safe and promising treatment for stable vitiligo lesions in different body sites.[3]

PRP is a concentration of autologous platelets in plasma enriched with bioactive molecules, including growth factors and cytokines that regulate tissue repair and regeneration.[9] Following centrifugation, PRP is administered intradermally into affected areas, where platelet-derived mediators promote cellular proliferation, differentiation, and modulation of inflammatory pathways. These growth factors exert an anabolic effect on mesenchymal stem cells, fibroblasts, epidermal cells, and endothelial cells, promoting regeneration and differentiation of cells, whereas anti-inflammatory cytokines block signals involved in the immune response.[9] The proposed mechanism in vitiligo includes stimulation of keratinocyte and fibroblast activity, enhancement of melanocyte survival, and modulation of local immune responses.[9]

Emerging evidence suggests that PRP may be beneficial in stable vitiligo either as monotherapy or in combination with phototherapy. Clinical studies have reported variable but promising repigmentation outcomes, although findings remain inconsistent across studies.[9] Importantly, evidence from local settings remains limited, underscoring the need for context-specific evaluation of its effectiveness and feasibility.[8,10,12]

This study aims to evaluate the clinical effectiveness and safety of autologous platelet-rich plasma (PRP) as a therapeutic intervention in patients with stable vitiligo. Specifically, the study will assess the extent of repigmentation using objective measures, evaluate patient-reported satisfaction, and document the safety profile associated with PRP therapy.

## Methods

**Study Design and Setting:** This study was designed as a prospective interventional cohort study. The study was conducted at the dermatology clinic of the National Hospital over one year (June 2021 to May 2022), including patients with stable vitiligo.

**Eligibility Criteria:** Patients with a clinical diagnosis of stable vitiligo, either segmental or generalized, were considered eligible. Stability was defined as no progression in lesion size over at least 12 months. Patients receiving standard therapies, including phototherapy, topical agents, or systemic treatments, were included. Exclusion criteria comprised patients with mucosal vitiligo, haemoglobin levels below 10 g/dL or platelet counts below 150,000/µL, those receiving anticoagulant therapy, pregnant or lactating women, and children under 12 years of age.

**Sample Size and Sampling:** Consecutive eligible patients attending the clinic during the study period were recruited. Based on a two-sided significance level of 95%, 80% power, and a 1:1 treated-to-control comparison, the calculated sample size was 22, which was considered feasible within the study duration.

**Data Collection:** Baseline data, including socio-demographic characteristics, disease duration, comorbidities, and treatment history, were collected using an interviewer-administered questionnaire. Treatment response, adverse effects, and patient satisfaction were recorded using structured data collection forms. Following informed written consent, data were collected by the principal investigator in the participant's preferred language, ensuring confidentiality and standardised procedures. Baseline laboratory assessment included a full blood count to ensure eligibility for platelet-rich plasma (PRP) preparation.

**Intervention:** At baseline, patients were categorized as having generalized or segmental vitiligo, and disease severity was assessed using the Vitiligo Area Scoring Index (VASI). Body surface area involvement was estimated using the hand unit method, where one hand unit represents approximately 1% of total body surface area. Patients with limited stable disease (≤1% body surface area) were selected for PRP therapy. For generalized vitiligo, a contralateral lesion served as the control, while in segmental or focal vitiligo, a comparable lesion was selected.

Autologous PRP was prepared from venous blood under aseptic conditions using centrifugation and administered intradermally into affected lesions following application of topical anaesthesia. Standardised clinical photographs and lesion measurements were obtained at baseline and at each follow-up visit. The intervention was repeated at four-week intervals for a total of four sessions, while patients continued their usual treatments.

**Outcome Assessment:** Participants were reviewed at four-week intervals to assess treatment response and adverse effects. Treatment response was evaluated as the percentage reduction in VASI score and categorized as excellent (>75%), good (50–75%), moderate (25–50%), or mild (<25%). Patients were followed up monthly for three months after completion of therapy, and patient satisfaction was assessed at the final visit.

**Statistical Analysis:** Data were entered into a Microsoft Excel database and subsequently analyzed using appropriate statistical software. Descriptive statistics, including proportions, means, and standard deviations, were used to summarize baseline characteristics and outcomes. Comparisons between treated and control lesions were performed using appropriate statistical tests based on data distribution and type, with paired comparisons of lesion size and VASI scores conducted using the Wilcoxon Signed-Rank test. A p-value of $<0.05$ was considered statistically significant.

**Ethical Considerations:** Ethical approval was obtained from the ethics review committee of the National Hospital of Sri Lanka, Colombo, and the ethical review committee reference number is AAJ/ETH/COM/2021/JULY. Participants were provided with information sheets in their preferred language and informed that written consent was obtained before enrolment. Privacy and confidentiality were strictly maintained throughout the study.

## Results

A total of twenty-two (22) patients with stable vitiligo who attended the dermatology clinic at the National Hospital of Sri Lanka over 1 year were included in the study. Of these, 6 were males (27.3%), and 16 were females (72.7%), giving a male: female ratio of 1:2.6. The median age of the study population was 37 years, with ages ranging from 18 to 65 years (Table 1).

The presence of other medical conditions was assessed in all patients. Hypothyroidism, hypertension, bronchial asthma, dyslipidemia, diabetes mellitus, and bullous pemphigoid were identified in 22 patients. Ten patients had no other medical issues (Table 2).

Disease-related variables considered in this study included the duration of vitiligo, the anatomical site of the stable patch, and prior treatment history. The mean duration of disease was 7.8 years, with a median of 3 years(n=22). The majority of patients (n=15, 68.1%) had vitiligo for less than 10 years (Table 3).

Before initiating PRP therapy, all patients had received topical treatments (100%). A smaller proportion had undergone additional therapies, including narrowband UVB phototherapy (9.1%), oral dexamethasone (9.1%), methotrexate (4.5%), and Ayurvedic treatments (4.5%).

Stable vitiligo patches were most commonly located on the shin (40.9%), followed by the foot (18.1%), forearm (9.1%), face (9.1%), axilla (4.5%), palm (4.5%), dorsum of the hand (4.5%), breast (4.5%), and thigh (4.5%).

All participants were instructed to continue their routine medications during the PRP treatment period. The majority (n = 12, 54.5%) remained on topical therapies as part of their ongoing regimen.

Out of 22 patients, one patient showed excellent response, one showed good response, one showed moderate response, 6 showed mild response, and 13 showed no response in the VASI score of the treated patch with PRP.

In the control patch, one patient showed excellent response, one showed good response, one showed moderate response, one showed mild response, and 18 showed no response in the VASI score (Table 4).

There was a statistically significant reduction in the diameter of the treated patch following PRP therapy, with the median diameter decreasing from 6.0cm to 5.9cm ($P$ = 0.002). In contrast, the diameter of the control patch showed no significant change (median before and after = 4.5, $P$ = 0.058) (Table 5).

**Table 1. Socio-demographic factors (n=22)**

| Gender | | Age | |
|---|---|---|---|
| **Male** | **Female** | **Mean** | **Median** |
| 6 (27.3%) | 16 (72.7%) | 39.4 | 37 |

**Table 2. Comorbidities-related information (n=22)**

| Disease | Number | Percentage |
|---|---|---|
| Hypothyroidism | 4 | 18.1% |
| Hypertension | 4 | 18.1% |
| Bronchial asthma | 2 | 9.1% |
| Dyslipidemia | 3 | 13.6% |
| Diabetes mellitus | 4 | 18.1% |
| Bullous pemphigoid | 1 | 4.6% |
| None | 10 | 45.4% |

**Table 3. Disease-related characteristics of patients with stable vitiligo (n=22)**

| Characteristics | N (%) |
|---|---|
| **Duration of the vitiligo** | |
| <10 years | 15 (68.1%) |
| 10-20 years | 3 (13.6%) |
| >20 years | 4 (18.1%) |
| **Previous treatments** | |
| Topicals (steroids/tacrolimus) | 22 (100%) |
| NBUVB | 2 (9.1%) |
| Oral dexamethasone | 2 (9.1%) |
| Oral methotrexate | 1 (4.5%) |
| Ayurvedic(topical) | 1 (4.5%) |
| **Site of the stable patch** | |
| Shin | 9 (40.9%) |
| Foot | 4 (18.1%) |
| Forearm | 2 (9.1%) |
| Face | 2(9.1%) |
| Thigh | 1 (4.5%) |
| Axilla | 1 (4.5%) |
| Breast | 1 (4.5%) |
| Dorsum of Hands | 1 (4.5%) |
| Palm | 1 (4.5%) |
| **Usual treatment continued** | |
| Topical steroid + topical tacrolimus | 7 (31.8%) |
| Oral dexamethasone + oral methotrexate + topical tacrolimus | 4 (18.1%) |
| Topical steroid | 3 (13.6%) |
| Topical tacrolimus | 2 (9.1%) |
| Oral dexamethasone+ topical steroid+ topical tacrolimus | 2 (9.1%) |
| Oral methotrexate+ topical steroid+ topical tacrolimus | 2(9.1%) |
| Oral methotrexate | 1 (4.5%) |
| Oral methotrexate+ topical tacrolimus | 1 (4.5%) |

**Table 4. Treatment response based on percentage reduction in VASI score in treated and control patches (n=22)**

| VASI response | Treated patch n (%) | Control patch n (%) |
|---|---|---|
| >75-100 %reduction (excellent response) | 1 (4.5%) | 1 (4.5%) |
| 50-75% reduction (good response) | 1 (4.5%) | 1 (4.5%) |
| 25-50% reduction (moderate response) | 1 (4.5%) | 1 (4.5%) |
| <25% reduction (mild response) | 6 (27.3%) | 1 (4.5%) |
| 0% reduction (no response) | 13 (59.1%) | 18 (81.8%) |

**Table 5. Maximum diameter of treated and control patches before and after PRP treatment (n=22)**

| | Treated patch | | | Control patch | | |
|---|---|---|---|---|---|---|
| Patient No: | Pre-treatment diameter (cm) | Diameter after 7 weeks (cm) | Difference (cm) | Pre-treatment diameter (cm) | Diameter after 7 weeks (cm) | Difference (cm) |
| 1 | 3 | 1.5 | 1.5 | 2 | 0 | 2 |
| 2 | 2.5 | 2.3 | 0.2 | 2 | 1.8 | 0.2 |
| 3 | 8.5 | 7 | 1.5 | 5 | 5 | 0 |
| 4 | 5.5 | 5.5 | 0 | 4 | 4 | 0 |
| 5 | 8.5 | 8.5 | 0 | 6.5 | 6.5 | 0 |
| 6 | 1.5 | 1.5 | 0 | 1 | 1 | 0 |
| 7 | 10 | 9 | 1 | 9 | 9 | 0 |
| 8 | 2 | 1 | 1 | 2 | 1.5 | 0.5 |
| 9 | 5 | 5 | 0 | 5 | 5 | 0 |
| 10 | 6.5 | 6.4 | 0.1 | 4 | 4 | 0 |
| 11 | 3 | 3 | 0 | 2.5 | 2.3 | 0.2 |
| 12 | 2 | 1.9 | 0.1 | 1.7 | 1.7 | 0 |
| 13 | 2 | 1.8 | 0.2 | 2 | 2 | 0 |
| 14 | 10 | 10 | 0 | 5 | 5 | 0 |
| 15 | 28 | 27 | 1 | 25 | 25 | 0 |
| 16 | 11 | 11 | 0 | 10 | 9.5 | 0.5 |
| 17 | 4 | 4 | 0 | 2 | 2 | 0 |
| 18 | 7.5 | 7.5 | 0 | 6 | 6 | 0 |
| 19 | 7.5 | 7.4 | 0.1 | 6.5 | 6.5 | 0 |
| 20 | 23 | 22.5 | 0.5 | 17 | 17 | 0 |
| 21 | 6 | 6 | 0 | 3.5 | 3.5 | 0 |
| 22 | 6 | 5.8 | 0.2 | 5 | 5 | 0 |

**Table 6. VASI scores of treated and control patches before and after PRP treatment (n=22)**

| | Treated patch | | | Control patch | | |
|---|---|---|---|---|---|---|
| Patient No: | Pre-treatment VASI score | VASI score after 7 weeks | Difference | Pre-treatment VASI score | VASI score after 7 weeks | Difference |
| 1 | 100 | 25 | 75 | 100 | 10 | 90 |
| 2 | 100 | 100 | 0 | 100 | 100 | 0 |
| 3 | 75 | 25 | 50 | 75 | 25 | 50 |
| 4 | 100 | 100 | 0 | 100 | 100 | 0 |
| 5 | 100 | 100 | 0 | 100 | 100 | 0 |
| 6 | 100 | 100 | 0 | 100 | 100 | 0 |
| 7 | 90 | 75 | 15 | 90 | 75 | 15 |
| 8 | 75 | 50 | 25 | 75 | 50 | 25 |
| 9 | 100 | 100 | 0 | 100 | 100 | 0 |
| 10 | 100 | 90 | 10 | 100 | 100 | 0 |
| 11 | 90 | 75 | 15 | 90 | 90 | 0 |
| 12 | 90 | 75 | 15 | 90 | 90 | 0 |
| 13 | 100 | 100 | 0 | 90 | 90 | 0 |
| 14 | 100 | 100 | 0 | 100 | 100 | 0 |
| 15 | 90 | 75 | 15 | 90 | 90 | 0 |
| 16 | 75 | 75 | 0 | 75 | 75 | 0 |
| 17 | 100 | 100 | 0 | 100 | 100 | 0 |
| 18 | 100 | 100 | 0 | 100 | 100 | 0 |
| 19 | 90 | 90 | 0 | 90 | 90 | 0 |
| 20 | 90 | 75 | 15 | 90 | 90 | 0 |
| 21 | 90 | 90 | 0 | 90 | 90 | 0 |
| 22 | 100 | 100 | 0 | 100 | 100 | 0 |

Similarly, a significant improvement was observed in the VASI score of the treated patch, with the median score decreasing from 100 to 90 (n=22, *P*=0.008). The control patch did not show a statistically significant change in VASI score (median before = 95, after = 90; n=22, *P* = 0.106) (Table 6).

**Complications of PRP treatment:** Complications were assessed during the procedure. All the patients experienced pain during injection (n=22, 100%), transient numbness at the injection site occurred in 1(n=1, 4.5%), and bruising lasted for 5 days after an injection was experienced in 1(n=1, 4.5%).

**Patient satisfaction with PRP treatment:** Patients' satisfaction was assessed using a questionnaire at the end of PRP treatment. Nine patients (n=9, 40%) were happy with the outcome of the PRP treatment compared to the usual treatments they had for vitiligo, and 13 patients (n=13, 59%) were not happy with the outcome of the PRP treatment.

15 patients (n=15, 68.1%) were happy with the injection procedure, and 7 patients (n=7, 31.8%) were not happy with the injection procedure.

12 patients (n=12, 54.5%) were happy to recommend this procedure to a friend/relative, 7 patients (n=7, 31.8%) did not want to recommend this procedure to a friend/relative, and 3 patients (n=3, 13.6%) stayed neutral with their opinion.

## Discussion

This is the first known study conducted in Sri Lanka to evaluate the effectiveness of PRP therapy in patients with stable vitiligo. In addition to assessing therapeutic outcomes, the study explored socio-demographic characteristics, disease-related factors, patient satisfaction, and adverse effects associated with PRP.

PRP was administered as an adjunct to the ongoing treatment regimens, which included topical and systemic therapies. Among the 22 participants (mean age: 37 years), only three (13.6%) demonstrated moderate-to-excellent repigmentation responses based on VASI scores, while the majority (59.1%) showed no observable improvement. Despite this, a statistically significant reduction in both the diameter and VASI score of the treated patches was observed ($p = 0.002$ and $p = 0.008$, respectively), highlighting a modest but measurable treatment effect. No significant changes were observed in the control patches.

These findings are broadly consistent with earlier studies, although overall clinical effectiveness varied. For example, a case series from Indira Gandhi Medical College, India, reported better responses with PRP, with two out of five patients showing excellent repigmentation. In that study, PRP was administered at 4-week intervals alongside topical tacrolimus.[9] Another study from Gujarat, India, involving 40 patients, found that 67.5% of participants responded to PRP, administered biweekly for six sessions.[6] Additionally, several international studies have demonstrated that PRP yields more favorable results when combined with other modalities, such as narrowband UVB phototherapy (NB-UVB) or fractional laser therapy. A pilot study in Egypt using PRP with NB-UVB showed significantly improved repigmentation in the combination group.[10] Similarly, a systematic review and meta-analysis from China concluded that combining PRP with fractional laser therapy significantly enhanced treatment outcomes.[11]

Notably, PRP was well tolerated by all patients in this study. Aside from transient injection-site pain (100%), only two patients experienced minor side effects: one reported transient numbness, and another experienced localized bruising. These findings reinforce the safety profile of PRP therapy, as previously reported in studies from Europe and Asia.

Patient satisfaction was mixed. While 40% of patients were satisfied with the treatment outcome, a majority (59%) were not. However, the majority of patients (68.1%) found the injection process acceptable, and over half expressed willingness to recommend the treatment, suggesting that while PRP's clinical efficacy may be limited in monotherapy, its tolerability and patient acceptability are favorable.

## Limitations

This study is limited by its small sample size and short follow-up duration, which may affect the generalizability and strength of the findings. Additionally, the concurrent use of other treatments introduces the possibility of confounding effects. Future studies with standardized protocols and larger, more diverse cohorts are recommended to better establish the role of PRP in vitiligo management.

## Conclusion

PRP appears to be a safe and moderately effective adjuvant treatment option for patients with stable vitiligo. While the intervention demonstrated statistically significant improvement in lesion size and VASI score, the overall clinical benefit remains modest, with most patients experiencing minimal or no repigmentation. PRP may hold greater potential when combined with established therapies such as NB-UVB or fractional lasers. Further large-scale, randomized studies are needed to determine optimal dosing intervals, treatment combinations, and long-term efficacy.

## Ethics statement

Ethical approval was obtained from the ethics review committee of the National Hospital of Sri Lanka, Colombo, and the ethical review committee approval number is AAJ/ETH/COM/2021/JULY. Participants were provided with information sheets in their preferred language and informed that written consent was obtained before enrolment. Privacy and confidentiality were strictly maintained throughout the study.

## Author contributions

TN served as the Principal Investigator and was responsible for the conceptualisation of the study, patient management, data collection, data analysis, and manuscript writing. JA supervised the study and assisted in the study design and manuscript drafting.

NJ supervised the study and provided guidance and assistance in PRP preparations. KW assisted in data analysis and the drafting of the manuscript.

## Data availability and confidentiality

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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