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REVIEW ARTICLE

Role of Platelet Derivatives in Regenerative Aesthetics and Platelet Rich Plasma in Managing Striae Distensae

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ABSTRACT

Background: Although platelet-derived bioproducts have long had widespread medical usage, there has been a dramatic uptick in their use for cosmetic and dermatological purposes in recent years. Important growth factors obtained from peripheral blood are stimulated to proliferate blood vessels by products like platelet-rich plasma (PRP) and platelet-rich fibrin (PRF). The fibrin polymerization process is aided by PRP and PRF in particular, resulting in a strong structure that can store many growth factors. Tissue regeneration is aided by these substances, which stimulate cell migration, differentiation, and proliferation as well as the creation of collagen and elastin. Aesthetic medicine makes use of these effects for a variety of reasons, such as restoring hair, treating scars, managing striae, and promoting wound healing. In addition, microneedling, laser therapy, and radiofrequency are just a few examples of how these biological products might complement conventional therapeutic methods. We aimed to present a summary of Role of platelet derivatives in regenerative aesthetics and platelet rich plasma in managing striae distensae**.** Conclusion: While platelet-rich plasma and its derivatives show great potential as non-invasive solutions to a range of cosmetic issues, there are still many unknowns and obstacles to overcome before they can be widely used. The growth factors included in PRP have a therapeutic significance in striae distensae management because they promote angiogenesis and upregulate collagen synthesis, two processes critical to tissue repair and remodeling.
Keywords: Platelet Derivatives, Platelet Rich Plasma, Striae Distensae.

INTRODUCTION

Because of their abundance of growth factors that are essential to the healing process, platelet-rich therapies tap on the potential of platelets. Several important players that promote tissue regeneration include these growth factors, which are contained within platelet granules: vascular endothelial growth factor (VEFG), platelet-derived growth factor (PDGF), and transforming growth factor beta (TGF-β). When combined, these elements stimulate the skin's natural healing process [1]. These growth factors orchestrate many essential cellular processes, stimulating cell movement, growth, specialization, the formation of new blood vessels (angiogenesis), and the restructuring of the skin's supporting tissue. Additionally, other bioactive molecules within platelets, such as ADP, ATP, serotonin, and calcium, further support healing. These substances are released when platelets are activated, triggering vascular remodeling and influencing the immune response to promote tissue repair [1,2]. For a long time now, these biological products have been used as restorative agents by stimulating vascularization in various tissues with growth factors extracted from peripheral blood. When these cells are activated, they create a fibrin network in a liquid form and secrete several growth factors that promote tissue regeneration. These substances stimulate cell migration, proliferation, and differentiation as well

as the creation of elastin and collagen [3]. Aesthetic medicine has investigated these effects for a variety of uses, including the treatment of alopecia, scars, surgical procedures, and wound healing (Figure 1).

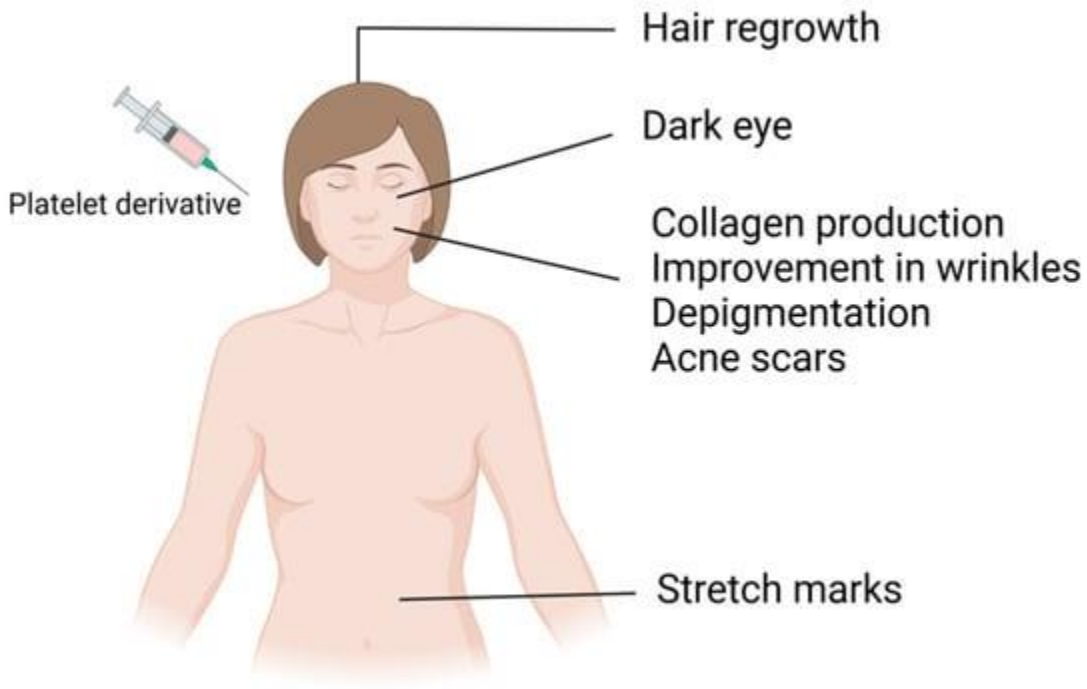

Figure 1: Application of platelet derivatives in regenerative aesthetics [1].

We aimed at this work to present a summary of Role of platelet derivatives in regenerative aesthetics and platelet rich plasma in managing striae distensae. Parameters like relative centrifugal force (RCF), duration, and the number of centrifugation cycles can differ across the many PRP preparation methods now available. This affects the product's efficacy, platelet composition, and integrity. Standardization and reproducibility are further complicated by the fact that PRP products differ in terms of both methodology and substance, which in turn produces distinct nomenclature and outcomes [4]. For example, wound healing is just one of many processes that may be impacted by the anticoagulants utilized in PRP preparations, according to recent research [3].

This is why a substitute platelet concentrate called platelet-rich fibrin (PRF) was created; it does not contain any additives (anticoagulants) and is manufactured using less centrifugal forces. (Figure 2). The PRF matrices' cell and growth factor content and dispersion are both improved by this procedure. Also, it's possible to inject it like PRP, which has the extra advantage of causing a fibrin clot to develop soon after it's injected into the target area. Reasons for its practicability include its low toxicity and high concentration of growth factors, which are similar to those of several PRP products. [5].

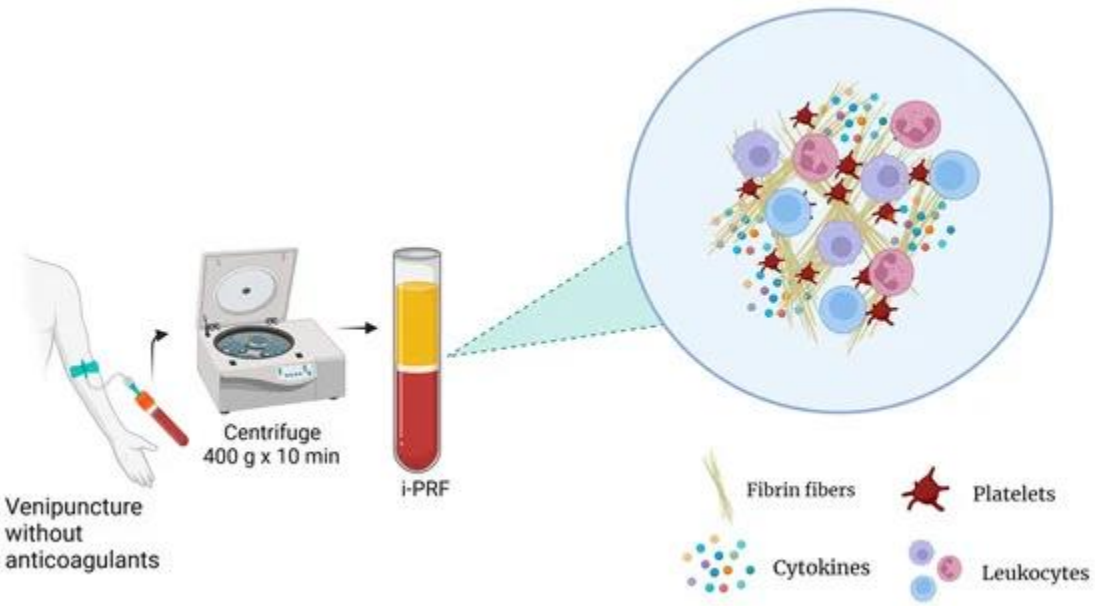

Figure 2: platelet-rich fibrin preparation [5].

Aesthetic Conditions:

I. Alopecia

The current state of hair loss treatment alternatives centers on growth cycle strategies that encourage cell proliferation and differentiation. Medications such as 2-5% topical minoxidil, which has several effects such as dilating blood vessels, reducing inflammation, and influencing the signaling of the Wingless and Int-1 gene (Wnt)/β-catenin, and oral finasteride, a specific inhibitor of 5α-reductase type II, are the most effective pharmacological therapy. While these medications do help some people with androgenetic alopecia (AGA), scientists are always looking for better options with fewer side effects. As a result of PRP's remarkable capacity to stimulate tissue regeneration, new therapy procedures utilizing this bioproduct have been devised, showing promise in the management of alopecia, particularly in AGA [6]. The precise mechanism of action of platelet-rich plasma (PRP) for the treatment of hair loss remains unclear, despite its widespread and effective usage in this area [7]. It is well-known that the hair follicle is a little organ that regenerates itself by changing its shape and metabolism. Each hair cycle consists of five distinct phases: anagen, catagen, return, telogen, and inactive. Furthermore, studies have indicated that platelet-rich plasma therapy increases activity in the FGF-7/β-catenin signaling pathway, which in turn causes follicular stem cell differentiation, promotes hair growth, and extends the anagen phase of the growth cycle. The perifollicular vascular plexus seems to be improved by PRP as well, with angiogenic factors like PDGF and VEFG levels elevated. [8].

A rat study found that injecting AGA with PRP sped up the hair cycle, indicating that PRP injections may stimulate hair growth. A randomized, placebo-controlled, double-blind trial was carried out with 52 patients with AGA to confirm the therapeutic efficacy of PRP in people. The study found that PRP injections significantly increased hair density in a relatively short amount of time. Compared to both the control group and baseline data, the PRP group showed substantial improvements in hair counts, hair diameters, and fraction of anagen hairs at the 6-month mark [9].

Thirty male and female patients were studied by Butt and colleagues [10] to determine the efficacy of platelet-rich plasma (PRP) in hair restoration. The parameters used in the evaluation included terminal-to-vellus hair ratio, hair density, photographs, the hair-pulling test, the physician global assessment score, and the patient global assessment score. The study's authors demonstrated that platelet-rich plasma is a viable alternative to standard treatments for androgenetic alopecia, with positive outcomes including higher terminal-to-vellus hair ratios, higher scores on physician and patient global assessments, and increased hair density.

In contrast, Shapiro et al. [11] compared saline to PRP when injected intradermally and looked at how it affected hair thickness and renewal. There was a small but noticeable improvement in hair density in both the PRP-treated and placebo-treated areas when

compared to the baseline. No statistically significant difference in hair density changes was seen between the two groups, according to these data. Differences in injection methods and types may explain why some studies found different effects from PRP while others found different results. More research is needed to determine what factors impact treatment outcomes, although this "design effect" may explain why PRP trials have shown conflicting results.

The majority of AGA investigations have only included male subjects or mixed-gender groups; nevertheless, there has been no separate evaluation of the effects in either gender. A meta-analysis that looked at PRP's effectiveness in both men and women found that it raised hair diameter significantly in both groups, but only men saw a significant rise in hair density [12]. Although platelet-rich plasma treatment had different effects on men and women, it showed promise when administered to both sexes.

To combat hair thinning and loss, many people have turned to various methods, such as platelet-rich plasma (PRP) therapy and microneedling, either alone or in combination. A key tenet of microneedling is that tiny punctures made to the skin in controlled ways set off a chain reaction that strengthens and grows hair by stimulating the dermal structures that are essential for the process. People suffering from hair loss saw a larger improvement in hair count after combining microneedling with topical PRP as opposed to after using PRP alone. It was found that combining these two treatments had a greater impact than using each one alone, particularly in patients with AGA. [13]. In order to increase the effectiveness of AGA treatment, several writers have mixed PRP with other drugs. Recent research by Wu and colleagues. [14] used PRPF in conjunction with minoxidil and platelet-rich plasma (PRP). One hundred and fifty-five patients diagnosed with AGA were randomly assigned to one of three therapy groups in this prospective, randomized, controlled trial. In the first group, PRPF was injected intradermally as a monotherapy; in the second group, patients had 5% topical minoxidil twice daily; and in the third group, PRPF injections were combined with topical minoxidil treatments. The hair counts, terminal hair counts, and growth rates of all patients treated with PRPF were higher than those of patients treated with minoxidil alone.

II. Skin Rejuvenation

Due to the aging global population, there has been a steady growth in the demand for aesthetic operations, especially rejuvenation, in recent years. Extrinsic variables that cause DNA damage include things like sun exposure, trauma, air pollution, alcohol intake, dietary difficulties, smoking, and chronological age; intrinsic factors that influence skin aging include things like genetic background and chronological age. These factors cause a disruption of the dermis and dysregulation of the stem cell population responsible for tissue repair by lowering or increasing expression of melanocytes, decreasing fibroblast activity, and decreasing collagen and elastin synthesis [15,16].

When it comes to rejuvenation, the main objective is to slow down or stop the aging process altogether by noninvasive or surgical means. A significant decrease in the number of patients choosing surgical operations can be seen alongside the rising demand for aesthetic procedures that aim to prevent associated alterations and improve skin quality [16]. Extensive research has shown that platelet-rich plasma (PRP) is one of the most effective nonsurgical aesthetic procedures, with few serious side effects and great patient satisfaction. Pigmentation problems, atrophic acne scars, wrinkles, creases, loss of elasticity, and tissue volume loss are just some of the issues that PRP can help with when it comes to rejuvenating the face. We still don't know how platelet-rich plasma (PRP) and its derivatives work to rejuvenate the face. There is speculation that PRP's growth factors may affect gene expression for differentiation, boost cell proliferation, and aid in tissue repair. This may result in longer-lasting effects than other procedures since it promotes angiogenesis and cellular regeneration [17].

Injectable or topically applied PRP and its derivatives, in conjunction with microneedling or other aesthetic procedures, can enhance skin quality, texture, and tone. In a study including 30 female volunteers, Banihashemi and colleagues [18] examined the efficacy of two treatments of pure PRP spaced three months apart for face rejuvenation. Patients said their nasolabial folds and under-eye circles under the eyes improved dramatically. Results showed that platelet-rich plasma face rejuvenation was both effective and painless. When compared to erbium-doped yttrium aluminum garnet (Er: YAG) laser monotherapy, Nilforoushzadeh et al. [19] demonstrated that periorbital hyperpigmentation and wrinkles are much better treated with a combination of PRP and an Er: YAG laser

Similarly, Mahmoodabadi et al. [20] confirmed the efficacy of platelet-rich plasma (PRP) and its derivatives in reducing periorbital wrinkles in a

prospective clinical experiment. The periorbital areas of fifteen individuals were injected with PRF. The outcomes showed that the injection site skin looked younger and less wrinkled, as well as improved periorbital hyperpigmentation and deep, fine, and tiny wrinkles. After the process, participants may have temporary swelling at the injection site for up to one day. Rest assured; this swelling will go away without any problems.

Gonzalez-Ojeda and colleagues. [21] investigated the use of PRP to treat melasma, building on previous research showing that PRP has a positive effect on hyperpigmentation. We assessed twenty female patients with melasma before and after they had three 15-day intervals of intradermal PRP treatments. Melanin concentration in the treated area, severity index score, patient satisfaction, and histological alteration degree were all compared. Histopathological improvements and reduced pigmentation were documented during dermatoscopy studies following PRP treatment. Additionally, there was a decrease in solar elastosis, inflammatory infiltration, and skin atrophy.

Face skin regeneration using PRP has been the subject of multiple studies due to its possible advantages. Biometric variables and patient satisfaction were used to evaluate the efficacy of platelet-rich plasma (PRP) intradermal injections in a face rejuvenation study. The redness and stiffness of the skin improved, the count and depth of wrinkles decreased, and the area and number of blemishes diminished significantly. Achieving an average score greater than 90% on the patient satisfaction index was accomplished after six months [22]. Twenty individuals with various types of wrinkles were studied in a comparable manner to determine the safety and effectiveness of intradermal PRP injections for rejuvenation and wrinkle therapy. The study found that injecting PRP into the skin was a safe and effective way to rejuvenate the face and significantly reduce the appearance of wrinkles, particularly in the nasolabial folds [23].

When it came to rejuvenating the skin of the face, Hassan et al. [24] concentrated on injectable platelet-rich fibrin (i-PRF). At the 3-month follow-up, the study saw significant changes in a number of skin metrics, such as surface spots, pores, wrinkles, UV spots, skin texture, and porphyrins. Improving the skin's quality and the overall appearance of the face—including the cheeks, lower face, jawline, and lips—had a significant impact on patients' satisfaction with their appearance. The study emphasized the efficacy and safety of intradermal i-PRF, highlighting the fact that it boosted patient satisfaction with no major side effects.

Silva and colleagues. [25], on the other hand, resorted to lyophilized PRP since it is easier to collect many injections' worth of samples from a single venipuncture. In a phase II pilot research, the scientists compared the efficacy of this preparation—which is administered intradermally once a month—to that of saline in the treatment of skin aging. Mesotherapy with freeze-dried PRP did not slow skin aging, according to their findings.

There is clinical evidence that PRP can be used either on its own or in conjunction with other substances such hyaluronic acid, microneedling agents, or lasers. Hyaluronic acid and platelet-rich plasma (PRP) together have the potential to increase the release and retention of growth factors, which in turn can stimulate fibroblast activation and improve collagen synthesis, all of which contribute to skin rejuvenation. Hersant et al. [26] set out to demonstrate the therapeutic benefits of PRP and hyaluronic acid combination in a prospective, open-label trial. At the 6-month point, as compared to the baseline, the study found a significant improvement using FACE-Q scores and biophysical parameters.

Research out of Korea found that fractional laser treatments involving platelet-rich plasma (PRP) improved skin elasticity and patient satisfaction while decreasing erythema rates. The dermal epidermis becomes more cohesive, collagen fibers multiply, and fibroblasts proliferate. When it came to renewing the neck region, Gawdat et al. [27] evaluated fractionated radiofrequency (fr-RF) microneedling as a standalone treatment and in combination with platelet-rich plasma (PRP). Medical evaluation using the Global Aesthetic Improvement Scale (GAIS) indicated moderate-to-excellent results, and patient satisfaction was high, all of which point to a general improvement in the neck's appearance after the combined treatment.

Accelerating the regeneration process, platelet-rich plasma and its derivatives used in conjunction with other rejuvenation procedures improve outcomes while decreasing negative effects. Cai et al. [28] showed one of these correlations, Those who aimed to determine if platelet-rich plasma (PRP) could enhance the reparative benefits of erbium fractional laser treatments. Although there are a number of potential adverse effects, including erythema and pigmentation, this therapy is popular due to its impressive anti-aging effects on the skin. Based on their findings, they recommend combining erbium fractional laser irradiation with platelet-rich plasma

(PRP) injections to rejuvenate aging facial skin. The combination has few adverse effects and is both effective and safe.

There are a number of options for cosmetic medicine practitioners seeking to treat atrophying acne scars. Among these methods are dermabrasion, fractional lasers, microneedling, radiofrequency, punch excision, suturing, subcision, and autologous dermal grafting, fat grafting, and platelet-rich plasma and platelet-rich fibrin grafting. One of the most prevalent forms of cosmetic dysfunction, acne scars have the potential to diminish one's sense of self-worth and overall happiness. Consequently, there is a growing need for alternatives to traditional treatment methods that can lessen the impact of this condition. For the purpose of comparing PRP administration following subcision for acne scars, an experimental analytical study was performed on 40 patients. Following subcision, autologous platelet-rich plasma (PRP) was injected into each scar on the patient's right side of the face. The control group underwent solely subcision on the left side of their faces. In the case of post-acne scars, the combination of PRP and subcision produced better benefits than subcision alone. Researchers found that PRP and subcision worked together to reduce the visibility of acne scars [29].

When it comes to treating atrophic acne scars Diab et al. [30] compared PRF with PRP, intradermal application, and microneedling. The subjects were divided into two groups, and each group got a facial treatment. Both groups had PRP or PRF injected intradermally into the left side of the face, whereas the right side had microneedling and topical PRP or PRF. On either side of the face, the severity of the acne scars was not significantly different. Nevertheless, compared to the PRP-only group, the PRF group showed substantially more improvement either treated alone or in conjunction with microneedling. Guo and colleagues investigated the safety and effectiveness of combining a CO2 dot matrix laser with PRP in a clinical setting. Patients' psychological well-being, quality of life, and scar repair effectiveness can be significantly enhanced by integrating the two approaches, according to their findings [31].

III. Striae

The medical term for what are medically known as stretch marks is striae distensae (S.D.). Skin tension lines appear clinically as parallel striae when S.D. is present. Pregnancy, obesity, hormonal fluctuations, and genetic susceptibility are common risk factors for these tumors, which histologically mimic dermal scars and mainly affect females. Stretch marks are classified into two groups according to the stages of development and the clinical and histological characteristics of each. Early on, as collagen undergoes structural changes and elastin and fibrillin fibers reorganize and reduce in number, stretch marks, also called "striae rubra" (S.R.), appear as tight, red lesions. When they reach the atrophic and hypopigmented stage, they are called "striae alba" (S.A.). This is a condition where the mid-dermal tract releases enzymes that break down elastin and collagen locally [32,33].

There have been a lot of studies looking at various treatment modalities for stretch marks, and the results have been all over the place. Some of these methods include radiofrequency, microdermal abrasion, carboxytherapy, chemical peels, and various types of lasers (e.g., pulsed-dye, fractional CO2, Nd YAG, Er Glass, Er YAG, and diode lasers). But these approaches haven't shown to be convincing enough, and they have few side effects either. This biological tool has recently gained traction as a potential treatment for stretch marks, thanks to the well-documented biological effects of platelet-rich plasma [33].

In order to verify this theory, de Castro and colleagues. [34] injected intralesional PRP into the affected areas of abdomen striae and compared the structural alterations in the collagen and elastic fibers. In addition, the scientists hypothesized that growth factor and Toll-like receptor (TLR) signaling pathways may be involved in the treatment's potential action mechanisms. The efficacy of PRP in diminishing the area of stretch marks was demonstrated by biopsies of the treated areas performed at treatment beginning, six weeks and twelve weeks after treatment. Along with this decrease, remodeling and the production of collagen and elastic fibers were stimulated. In addition, PRP raised the levels of TNF-α, VEFG, and IGF-1 via boosting the immunoreactivities of TLR2 and TLR4. These results highlight the therapeutic promise of PRP in the treatment of stretch marks.

Recent research has detailed the in vitro effects of sodium ascorbate and platelet-rich plasma on stretch-marked fibroblasts (SMFs). Prior to and following the addition of various quantities of PRP and sodium ascorbate to the culture media, the expression of type I collagen was assessed. Both compounds increased cell proliferation and type I collagen expression in SMFs, according to this study. The cell viability was 140% and 151% higher after 24 hours of incubation with 1% PRP and 5% PRP + sodium ascorbate,

respectively; after 48 hours, it was 156% higher and 178% lower, respectively. These findings demonstrated the efficacy of both therapies and provided support for the viability of SMF's metabolic activity-mediated improvement in stretch marks [35].

Given the facts provided, it is clear that PRP can be an effective method for treating stretch marks. Tissue repair, collagen synthesis, and elastic fiber formation are all regulated by the secretion of growth factors, which in turn stimulate the proliferation of fibroblasts. This is why Abdel-Motaleb et al. [36] evaluated the hypothesis that adding PRP to microneedling would increase its effectiveness in treating stretch marks. Forty people who had stretch marks were divided into two groups: one that had microneedling only, and another that received microneedling plus PRP. The results showed that the combination treatment improved skin lesion enhancement, increased fibroblast proliferative activity, decreased caspase-3 expression in the epidermis, and enhanced collagen and elastic-fiber deposition.

Fractional CO2 lasers are one of several types of lasers that work well for S.D. Sayed et al. [37] evaluated the effectiveness of a fractional CO2 laser alone with that of a CO2 laser + PRP in S.D. treatment to assess the synergistic effect of this laser alone with PRP. They looked at 30 adult female patients with S.D. who were randomly assigned to either laser monotherapy or laser plus PRP to see what kind of effect it had. For histological assessment, skin samples were collected from the lesions both before and after treatment. The authors found that compared to using just the fractional CO2 laser, the combined treatment yielded better results.

Similarly, thirty S.D. patients were studied by Neinaa and colleagues. [38] to determine the synergistic effect of fractional CO2 and pulsed-dye laser (PDL) in conjunction with PRP. After the patient underwent a PDL on the left side and a fractional CO2 laser on the right, they were each given an intradermal injection of PRP. Three treatment sessions were administered to the patients every six weeks. The clinical S.D. lesion outcomes were significantly improved by both treatment groups, but the combination of platelet-rich plasma (PRP) and fractional CO2 laser irradiation produced far better results with fewer side effects than the PRP + PDL alone.

Though they focused on striae gravidarum (S.G.), a connective-tissue disorder prevalent in first-time mothers, Preclaro et al. [39] investigated the combined effects of PRP and a fractional CO2 laser. Sixteen patients with S.G. were studied; half of them received a fractional CO2 laser treatment followed by platelet-rich plasma (PRP), while the other half received a fractional CO2 laser treatment followed by normal saline. Using an ablative fractional CO2 laser in conjunction with autologous PRP resulted in better clinical improvement and patient satisfaction scores, but there was no statistically significant difference in the other end measures. The trial was conducted over the course of three sessions spaced four weeks apart. It is possible that variations in procedures or types of striae might prevent PRP and other treatments from working together synergistically, according to these results. Ebrahim et al. [40] evaluated 75 female patients with S.D. to determine the safety and efficacy of three different PRP treatments: monotherapy, PRP plus subcision, and medium-depth peeling (70% glycolic acid followed by 35% trichloroacetic acid). Combining PRP with subcision or peeling was found to be more successful than PRP alone, according to their findings.

Problems still exist in the sector, even though PRP and PRF have promising effects on a variety of aesthetic issues (e.g., wrinkles, skin texture, hair loss, acne scars, hyperpigmentation), according to the research. Consistency and effectiveness are hindered by the lack of established protocols for PRP and PRF preparation, which causes methods and concentrations to vary across investigations. [40].

Several reasons contribute to the non-existence of a standardized PRP preparation strategy for specific objectives. Distinct platelet concentrations and growth factor compositions result from methodological variability in centrifugation and anticoagulants, which in turn makes it difficult to get consistent treatment results. Furthermore, individualized regimens are necessary due to the wide variety of PRP uses in different medical fields. Specialized formulations and delivery systems are required for different therapy aims, such as in orthopedic and dermatological applications. Nevertheless, because of the intricate interaction of variables, reaching an agreement on the best PRP formulations is still challenging [40].

Even with all these problems, PRP and PRF still provide great, non-invasive cosmetic treatments. The difficulties in drawing strong conclusions from the evidence are highlighted by the fact that some research relied on tiny sample sizes. Recognizing the limits of the current body of literature is critical, even though the evidence indicates a promising function

for PRF and PRP. For the field to progress and for results to be reproducible and reliable, it is imperative that these problems be addressed going ahead. It is essential for stakeholders to work together in order to build standardized PRP methods. The only way to overcome this obstacle is to establish consensus guidelines based on data collected from clinical trials. Possible methods to improve standardization may be offered by technological breakthroughs like automated processing systems [40].

Conclusion

While platelet-rich plasma and its derivatives show great potential as non-invasive solutions to a range of cosmetic issues, there are still many unknowns and obstacles to overcome before they can be widely used. The growth factors included in PRP have a therapeutic significance in striae distensae management because they promote angiogenesis and upregulate collagen synthesis, two processes critical to tissue repair and remodeling.

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References

1. Dos Santos RG, Santos GS, Alkass N, Chiesa TL, Azzini GO, da Fonseca LF,et al. The regenerative mechanisms of platelet-rich plasma: A review. *Cytokine*. 2021;144:155560.
2. Engebretsen L, Steffen K, Alsousou J, Anitua E, Bachl N, Devilee R, et al. IOC consensus paper on the use of platelet-rich plasma in sports medicine. *Br. J. Sports Med.* **2010**, *44*, 1072–81.
3. Emer J. Platelet-Rich Plasma (PRP): Current Applications in Dermatology. *Skin. Therapy Lett.* **2019**, *24*, 1–6
4. Perez AG, Lana JF, Rodrigues AA, Luzo AC, Belangero WD, Santana MH. Relevant aspects of centrifugation step in the preparation of platelet-rich plasma. *ISRN Hematol*. 2014;2014:176060.
5. Frautschi RS, Hashem AM, Halasa B, Cakmakoglu C, Zins JE. Current Evidence for Clinical Efficacy of Platelet Rich Plasma in Aesthetic Surgery: A Systematic Review. *Aesthet Surg J*. 2017;37(3):353-62.
6. Panchaprateep, R. Medical Treatment for Androgenetic Alopecia. *Facial Plast. Surg.* **2023**, *40*, 252–66
7. Paichitrojjana, A.; Paichitrojjana, A. Platelet Rich Plasma and Its Use in Hair Regrowth: A Review. *Drug Des. Dev. Ther.* **2022**, *16*, 635–45.
8. Gentile P, Garcovich S, Bielli A, Scioli MG, Orlandi A, Cervelli V. The Effect of Platelet-Rich Plasma in Hair Regrowth: A Randomized Placebo-Controlled Trial. *Stem Cells Transl Med*. 2015;4(11):1317-23.
9. Qu Q, Zhou Y, Shi P, Du L, Fan Z, Wang J, et al. Platelet-rich plasma for androgenic alopecia: A randomized, placebo-controlled, double-blind study and combined mice model experiment. *J. Cosmet. Dermatol.* **2021**, *20*, 3227–35.
10. Butt G, Hussain I, Ahmed F.J, Choudhery M.S. Efficacy of platelet-rich plasma in androgenetic alopecia patients. *J. Cosmet. Dermatol.* **2019**, *18*, 996–1001.
11. Shapiro J, Ho A, Sukhdeo K, Yin L, Lo Sicco K. Evaluation of platelet-rich plasma as a treatment for androgenetic alopecia: A randomized controlled trial. *J. Am. Acad. Dermatol.* **2020**, *83*, 1298–303.
12. Gupta A.K, Renaud H.J, Bamimore M. Platelet-rich plasma for androgenetic alopecia: Efficacy differences between men and women. *Dermatol. Ther.* **2020**, *33*, e14143.
13. Muhammad A, Iftikhar N, Mashhood A, et al. Comparison of Efficacy of Platelet-Rich Plasma (PRP) With PRP Microneedling in Androgenetic Alopecia. *Cureus*. 2022;14(10):e30418.
14. Wu S, Liu S, Chen J, Dai D, Liu W, Le D,et al. Evaluation of platelet-rich plasma plus basic fibroblast growth factor combined with minoxidil in the treatment of androgenetic alopecia: A randomized controlled trial. *J Cosmet Dermatol*. 2023;22(7):1995-2002.
15. Beltrán B, Sánchez M.A.R, Melamed G, Pinto H. Efficacy and safety of photothermal-bioactivated platelet-rich plasma for facial rejuvenation. *J. Cosmet. Dermatol.* **2023**, *22*, 671–3.
16. Xiao H, Xu D, Mao R, Xiao M, Fang Y, Liu Y. Platelet-Rich Plasma in Facial Rejuvenation: A Systematic Appraisal of the Available Clinical Evidence. *Clin. Cosmet. Investig. Dermatol.* **2021**, *14*, 1697–724.
17. Popescu M.N, Iliescu M.G, Beiu C, Popa L.G, Mihai M.M, Berteanu M, et al. Autologous Platelet-Rich Plasma Efficacy in the Field of Regenerative Medicine: Product and Quality Control. *Biomed. Res. Int.* **2021**, *2021*, 4672959.
18. Banihashemi M, Zabolinejad N, Salehi M, Hamidi Alamdari D, Nakhaizadeh S. Platelet-rich Plasma use for facial rejuvenation: A clinical trial and review of current literature. *Acta Biomed.* **2021**, *92*, e2021187.
19. Nilforoushzadeh M.A, Heidari-Kharaji M, Alavi S, Mahmoudbeyk M, Torkamaniha E, Peyrovan A, et

al. Assessing the effectiveness of the combination therapy with fractional Er-YAG laser and platelet-rich plasma in treatment of periorbital dark circles patients: A clinical trial. *J. Cosmet. Dermatol.* **2021**, *20*, 3526–36.
20. Mahmoodabadi R.A, Golafshan H.A, Pezeshkian F, Shahriarirad R, Namazi M.R. Evaluation of the Effect of Platelet-Rich Fibrin Matrix in the Correction of Periorbital Wrinkles: An Experimental Clinical Trial. *Dermatol. Pract. Concept.* **2023**, *13*, e2023050.
21. González-Ojeda A, Cervantes-Guevara G, Chejfec-Ciociano J.M, Cervantes-Cardona G.A, Acevedo-Guzman D, Puebla-Mora A.G, et al. Treatment of melasma with platelet-rich plasma: A self-controlled clinical trial. *Dermatol. Ther.* **2022**, *35*, e15703.
22. Everts P.A, Pinto P.C, Girao L. Autologous pure platelet-rich plasma injections for facial skin rejuvenation: Biometric instrumental evaluations and patient-reported outcomes to support antiaging effects. *J. Cosmet. Dermatol.* **2019**, *18*, 985–95.
23. Elnehrawy N.Y, Ibrahim Z.A, Eltoukhy A.M, Nagy H.M. Assessment of the efficacy and safety of single platelet-rich plasma injection on different types and grades of facial wrinkles. *J. Cosmet. Dermatol.* **2017**, *16*, 103–11.
24. Hassan H, Quinlan D.J, Ghanem A. Injectable platelet-rich fibrin for facial rejuvenation: A prospective, single-center study. *J. Cosmet. Dermatol.* **2020**, *19*, 3213–21.
25. da Silva L.Q, Cancela R.B.B, de Lima Montalvão S.A, Huber S.C, Vieira-Damiani G, Triglia R.M et al. The effect of lyophilized platelet rich-plasma on skin aging: A nonrandomized, controlled, pilot trial. *Arch. Dermatol. Res.* **2021**, *313*, 863–71.
26. Hersant B, SidAhmed-Mezi M, Aboud C, Niddam J, Levy S, Mernier T.; et al. Synergistic Effects of Autologous Platelet-Rich Plasma and Hyaluronic Acid Injections on Facial Skin Rejuvenation. *Aesthet. Surg. J.* **2021**, *41*, 854–65.
27. Gawdat H, Allam RSHM, Hegazy R, Sameh B, Ragab N. Comparison of the efficacy of Fractional Radiofrequency Microneedling alone and in combination with platelet-rich plasma in neck rejuvenation: a clinical and optical coherence tomography study. *J Cosmet Dermatol*. 2022;21(5):2038-45.
28. Cai J, Tian J, Chen K, Cheng L.H, Xuan M, Cheng B. Erbium fractional laser irradiation combined with autologous platelet-rich plasma and platelet-poor plasma application for facial rejuvenation. *J. Cosmet. Dermatol.* **2020**, *19*, 1975–9.
29. Deshmukh N.S, Belgaumkar V.A. Platelet-Rich Plasma Augments Subcision in Atrophic Acne Scars: A Split-Face Comparative Study. *Dermatol. Surg.* **2019**, *45*, 90–8.
30. Diab NAF, Ibrahim AM, Abdallah AM. Fluid Platelet-Rich Fibrin (PRF) Versus Platelet-Rich Plasma (PRP) in the Treatment of Atrophic Acne Scars: A Comparative Study. *Arch Dermatol Res*. 2023;315(5):1249-55.
31. Guo R, Xuan W, He X, Xu K. Safety and efficacy of CO_2 dot matrix laser combined with platelet-rich plasma on depressed scar after acne vulgaris and influencing factors of its repair effect: A retrospective analysis. *J. Cosmet. Dermatol.* **2023**, *22*, 850–61.
32. Sawetz I, Lebo P.B, Nischwitz S.P, Winter R, Schaunig C, Brinskelle P, et al. Platelet-rich plasma for striae distensae: What do we know about processed autologous blood contents for treating skin stretchmarks?—A systematic review. Int. Wound J. 2021, 387–95.
33. Sany I, Mohamed Sobhi R, Badawi A, Mohamed Elmaadawi Z, Mostafa PI N. Comparative Study between the Efficacy of Fractional CO2 Laser/Radiofrequency, PRP and a Combination of Both in the Treatment of Striae Distensae: A Pilot Study. Clin. Cosmet. Investig. Dermatol. 2022, 15, 1687–94.
34. de Castro Roston J.R, Reis I.B, Luzo Â.C.M, Roston M.O, Durán N, Fávaro W.J. Evaluation of the tissue repair process and immunomodulatory action of Platelet-Rich Plasma (PRP) in the treatment of abdominal stretch marks. *Tissue Cell* **2023**, *83*, 102132.
35. La Padula S, Hersant B, Pizza C, Chesné C, Jamin A, Ben Mosbah I, et al. Striae Distensae: In Vitro Study and Assessment of a Combined Treatment with Sodium Ascorbate and Platelet Rich Plasma on Fibroblasts. *Aesthetic Plast. Surg.* **2022**, *46*, 561–2
36. Abdel-Motaleb A.A, Zedan H, Mostafa M.M, Abu-Dief E.E, Gebril S.M, Abdelwahed Hussein M.R. Combined micro needling with topical application of platelet-rich plasma versus micro needling alone in the treatment of stria distensae: Clinicopathological analysis. *J. Dermatol. Treat.* **2022**, *33*, 836–47.
37. Sayed D.S, Badary D.M, Ali R.A, Abou-Taleb D.A.E. Combined Fractional CO_2 Laser with Intradermal Platelet-Rich Plasma versus Fractional CO_2 Laser Alone in the Treatment of Striae Distensae. *Dermatol. Surg.* **2023**, *49*, 552–8.

38. Neinaa Y.M.E, Gheida S.F, Mohamed D.A.E. Synergistic effect of platelet-rich plasma in combination with fractional carbon dioxide laser versus its combination with pulsed dye laser in striae distensae: A comparative study. Photodermatol. Photoimmunol. Photomed. 2021, 37, 214–23.
39. Preclaro IAC, Tianco EAV, Buenviaje-Beloso M. Efficacy of ablative fractional carbon dioxide laser combined with autologous platelet-rich plasma versus ablative fractional carbon dioxide laser and placebo in the treatment of striae gravidarum: A randomized clinical trial. *J Cosmet Dermatol*. 2022;21(10):4354-64.
40. Ebrahim HM, Salem A, Salah T, Eldesoky F, Morsi HM. Subcision, chemical peels, and platelet-rich plasma: Combination approaches for the treatment of striae distensae. *Dermatol Ther*. 2022;35(2):e15245.

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