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Evaluation of the Effectiveness of Injections of Autologous Platelet-Rich Plasma into Facial Skin

Alina Koshkinbayeva [1,*], Alina Ogizbayeva [2], Olga Ponamareva [3], Bauyrzhan Omarkulov [1] and Yana Yutskovskaya [4]

[1] Department of Family Medicine, NJSC "Karaganda Medical University", Karagandy 100008, Kazakhstan; omarkulov@qmu.kz
[2] Department of Emergency Medical Care, Anesthesiology and Resuscitation, NJSC "Karaganda Medical University", Karagandy 100008, Kazakhstan; eleusizova.a@kgmu.kz
[3] Department of Biomedicine, NJSC "Karaganda Medical University", Karagandy 100008, Kazakhstan
[4] Clinic of Professor Yutskovskaya, LLC., Moscow 129626, Russia
* Correspondence: shar_surgeon89@mail.ru; Tel.: +7-7079799997

Abstract: The purpose of this research was to assess the effectiveness of PRP injections into facial skin and to identify which of the studied blood parameters can affect the effectiveness of the procedure. The research involved 50 women aged 20 to 52 years who received intradermal PRP injections into facial skin. A general examination, complete blood count, and D-dimer, estradiol, and insulin in the blood serum were measured before the procedure, and assessment of the skin's condition using a facial skin analyzer, assessment of midface volume changes using the Midface Volume Deficit Scale, assessment of aesthetic improvement by the doctor and the patient (Global Aesthetic Improvement Scale, GAIS) before and 1 month after the procedure were conducted for all the subjects involved in the research. According to the GAIS, both from the doctor's and the patients' perspectives, the majority noted some improvement in the skin condition after the procedure; however, according to the skin analyzer data, there were no statistically significant changes. A total of 56% of the patients displayed improvement in the midface volume, and this was observed in patients with a lower blood platelet count ($\leq 259 \times 10^9$/L) and a higher level of estradiol (>99 pg/mL) before the procedure. No undesirable effects were detected after the procedure.

Keywords: platelet-rich plasma; PRP; effectiveness; facial skin; dermatology; cosmetology

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1. Introduction

Autologous platelet-rich plasma (PRP) is particularly popular in various fields of medicine because it releases numerous chemokines, cytokines, and growth factors that stimulate angiogenesis, extracellular matrix remodeling, and cell differentiation and proliferation [1]. PRP is presently in great demand in aesthetic dermatology and cosmetology [2], including for the treatment of scars, stretch marks, alopecia [3], vitiligo, photoaging [4], and skin rejuvenation [5]. Most of the conducted studies have shown some positive local effects of PRP [2]; however, current studies on the clinical efficiency of PRP are not conclusive and homogeneous. The heterogeneity of the PRP specimens (different preparation methods; various concentrations of platelets and growth factors; the number of PRP injections, their frequency, intervals, and duration; use of combined treatment methods; the influence of age, sex, concomitant pathology of the patient) complicates the interpretation of the existing literature and limits the ability to give definitive recommendations on the clinical efficiency of PRP. Presently, there is no comprehensive standard algorithm for PRP preparation as well as no definite criteria for establishing indications for this procedure [6]. All these factors add some variability to the results obtained, which makes it difficult to judge the effectiveness of PRP.

Therefore, the purpose of this research was to assess the effectiveness of the PRP injections into facial skin and to identify which of the studied blood parameters can affect the effectiveness of the procedure.

2. Materials and Methods

2.1. Patients

This pilot study involved 50 women aged 20 to 52 years who received intradermal PRP injections into facial skin in order to assess the effect of using PRP. The research was conducted within the period from 18 November 2023 to 1 March 2024.

The following studies were conducted for all the subjects involved in the research:

- General examination with anamnesis to exclude any systemic diseases or acute viral/bacterial infectious diseases;
- After the procedure, the presence/absence of undesirable local and systemic reactions were checked (pain, itching, allergic reactions, bleeding, skin infections, etc.);
- Assessment of the skin's condition before and 1 month after the procedure using the 3D Bitmoji facial skin analyzer from Guangzhou Ideal Beauty Equipment Co., Ltd. (Guangzhou, China) (analysis of digital images through RGB (visible light), PL (polarized light), and UV (ultraviolet) spectra by assessing skin age, sensitivity, age spots, wrinkles, black spots, pores, and total score). The analyzer calculated a total score on a 100-point scale automatically. The total score was determined by comparing all the patient's results with the results of the same age category, embedded in the analyzer program;
- Assessment of midface volume changes before and 1 month after the procedure. For this purpose, the MFVDS (Midface Volume Deficit Scale) developed by G. J. Jeong et al. [7] was used. The midface volume deficit degree was measured as follows: 0 (none), 1—minimal, 2—mild, 3—moderate, 4—significant, and 5—severe. One month after the procedure, if the score on this scale decreased by 1 or more degrees, this result was considered as an improvement;
- Assessment of aesthetic improvement by the doctor and the patient (Global Aesthetic Improvement Scale (GAIS)) [8];
- A complete blood count before the procedure with the determination of lymphocytes and monocytes to exclude patients with inflammatory reactions and with the determination of platelets to exclude coagulation disorders;
- To exclude coagulation disorders—measuring d-dimer in the blood serum before the procedure;
- Determination of serum estradiol levels prior to the procedure during the follicular phase of the menstrual cycle to identify possible effects on the results of PRP injections into facial skin;
- Determination of serum insulin levels before the procedure to detect diabetes mellitus or metabolic disorders, provided that the patients were not aware of it during history taking, and to identify any possible effects on the results of PRP facial injections.

The patients with the following criteria were excluded from the research:

- Age under 20;
- Pregnant or lactating women;
- Deviations from normal values in blood tests before the procedure (especially thrombocytopenia, changes in the number of lymphocytes/monocytes (low/high));
- The presence of concomitant diseases such as coagulopathy, thyroid dysfunction, autoimmune and infectious diseases, diabetes mellitus, or any other severe concomitant diseases affecting well-being and quality of life;
- Taking any medications (especially receiving anticoagulant therapy).

All patients signed an informed consent before the examination and the procedure itself. The design of this study was approved by the Local Bioethics Commission.

2.2. PRP Preparation Methodology

Patients had their faces cleansed and anesthetized using 2.5% lidocaine cream 30 min prior to the procedure. At this time, venous blood was taken from the cubital vein in compliance with the rules of asepsis/antisepsis through a butterfly catheter with a 23G adapter into 3 tubes with heparin and a 9 mL separating gel. The tubes were then centrifuged at 3200 rpm for 5 min on a Plasmolife (China) centrifuge for plasma separation. Plasma was taken from the test tubes into sterile syringes with a volume of 3 mL. On average, the subjects received 13–14 mL of plasma.

Previously, we conducted a study on 20 volunteers to evaluate this method of preparing PRP. In this case, we obtained the following characteristics of PRP:

1. The average volume of PRP obtained was 4.5 ± 0.1 mL;
2. Activation status—not-activated PRP. PRP products can be used without the addition of an activation agent because platelet activation is spontaneously induced due to exposure to dermal collagen and thrombin once PRP is injected [9–11];
3. Removal of platelet-poor plasma—no;
4. To assess purity relative composition of the PRP (%) was calculated. Relative composition in platelets—58.6 ± 12.1, leukocytes—1.2 ± 0.3, red blood cells—40.2 ± 13.1. According to the DEPA classification, we received heterogeneous PRP [12];
5. Average dose of injected platelets was $1.2 \pm 0.2 \times 10^9$/L.

2.3. PRP Injection Technique into Facial Skin

After the onset of anesthesia, the facial skin was cleansed from cream and treated three times with a solution of chlorhexidine. Afterward, intradermal PRP injections were performed using needles with a diameter of 32G and a length of 6 mm. Injections were administered starting from a depth of 4–5 mm throughout the hypodermis and dermis layer, in a uniform dose of 0.2–0.3 mL with an interval of 1–1.5 cm between injections along the facial surface marked in green in Figure 1. Injections in a dose of 0.4 mL with an interval of 2–2.5 cm between injections along the facial surface marked in blue in Figure 1 were administered starting from a depth of 6 mm throughout the hypodermic and dermis layer. The angle of the needle during injection was 80–90 degrees. Once injections were completed, the skin was cleansed with chlorhexidine solution and dexpanthenol cream was applied to the area.

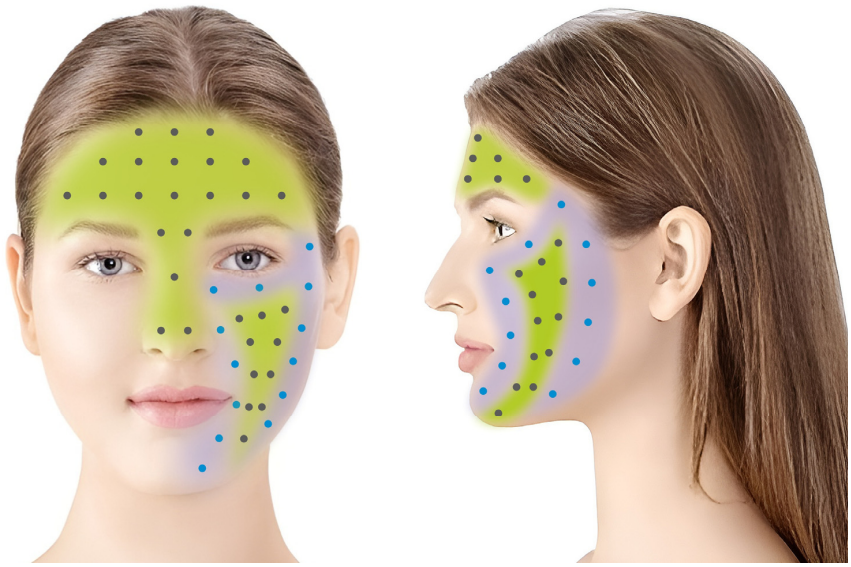

Figure 1. PRP injection technique into facial skin. Green color shows injection zones with an injection depth of 4–5 mm in a dose of 0.2–0.3 mL with an interval of 1–1.5 cm between injections. Blue color shows injection zones with an injection depth of 6 mm in a dose of 0.4 mL with an interval of 2–2.5 cm between injections.

2.4. Ethics Statement

The research was conducted in accordance with the principles of the Helsinki Declaration and approved by the Local Bioethics Commission (MOM No. 15 with assigned number No. 98 dated 17 November 2023). Written informed consent was obtained from all participants included in the research.

2.5. Statistical Analysis

The statistical analysis was carried out by the STATISTICA 8.0. (StatSoft) software. The median, (Me), lower and upper quartiles (Q1, Q3) were calculated. Changes in dynamics were evaluated using Wilcoxon's nonparametric criterion. For independent groups, the nonparametric Mann–Whitney criterion was used when comparing 2 groups. Spearman's nonparametric rank correlation method was used to identify correlational relationships. To determine the optimal threshold values, ROC curves were constructed and Youden's index was also determined. The results were considered statistically significant at $p < 0.05$.

3. Results

3.1. Patient Profiles

The results of the laboratory examination of patients (n = 50) before the procedure are presented in Table 1 and Figure 2. The median age was 35.0 (Q1–Q3:28.0–41.0).

Table 1. Basic profiles of patients.

Indicators	Median	Lower Quartile	Upper Quartile	Normal Range [13]
Blood lymphocytes (%)	33.75	28.00	38.00	18–40
Blood monocytes (%)	7.30	5.30	8.40	2.0–9.0
Blood platelets ($\times 10^9$/L)	259.00	229.00	337.00	180–320
D-dimer (mcg/mL)	0.11	0.07	0.14	<0.243
Insulin (μU/mL)	7.50	5.80	9.50	<20
Estradiol (pg/mL)	98.00	62.00	194.00	Follicular phase 10–180

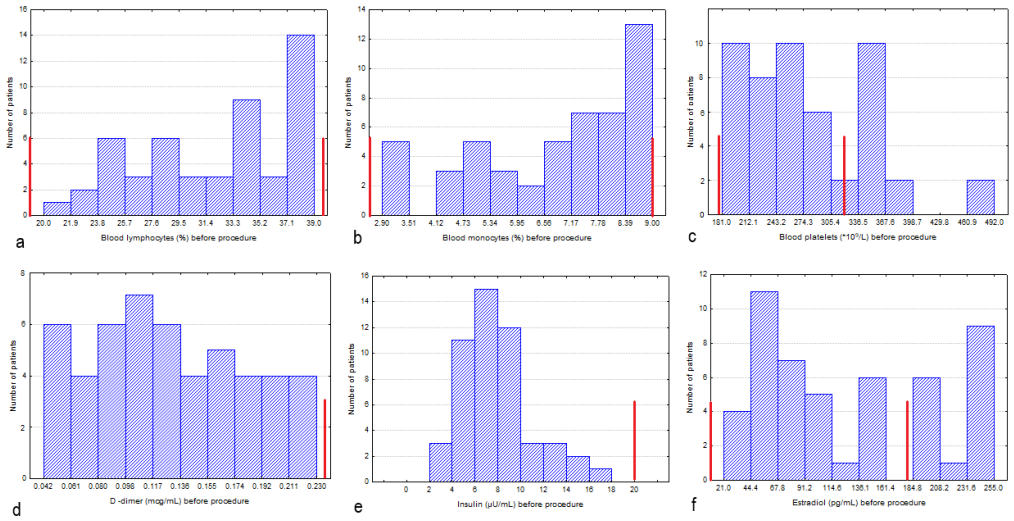

Figure 2. The results of the laboratory examination for each patient (n = 50) before the procedure: (**a**) blood lymphocytes (%), (**b**) blood monocytes (%), (**c**) blood platelets ($\times 10^9$/L), (**d**) D-dimer (mcg/mL), (**e**) insulin (μU/mL), (**f**) estradiol (pg/mL). The normal range is marked with red lines.

The levels of lymphocytes and monocytes before the procedure in all patients were within the norms, which indicates the absence of inflammatory reactions that may affect the effectiveness and safety of the procedure.

In 16 patients (32%), blood platelets were elevated (329–492 $\times$ 10^9/L), and to exclude the active process of thrombosis, the D-dimer was studied, the levels of which were within the normal range in all patients.

Insulin levels in all the subjects were within normal limits, indicating the possible absence of diabetes mellitus or metabolic disorders. The blood estradiol levels were slightly elevated in 16 patients (ranging from 184.8 to 255 pg/mL); no patients with low estradiol concentrations were identified.

3.2. Skin Assessment before and 1 Month after the Procedure Using a Facial Skin Analyzer

As an example, Figure 3 shows the digital images of a skin analyzer assessing various skin parameters before injecting PRP into the face. Table 2 shows the parameters determined by the skin analyzer before and 1 month after the procedure.

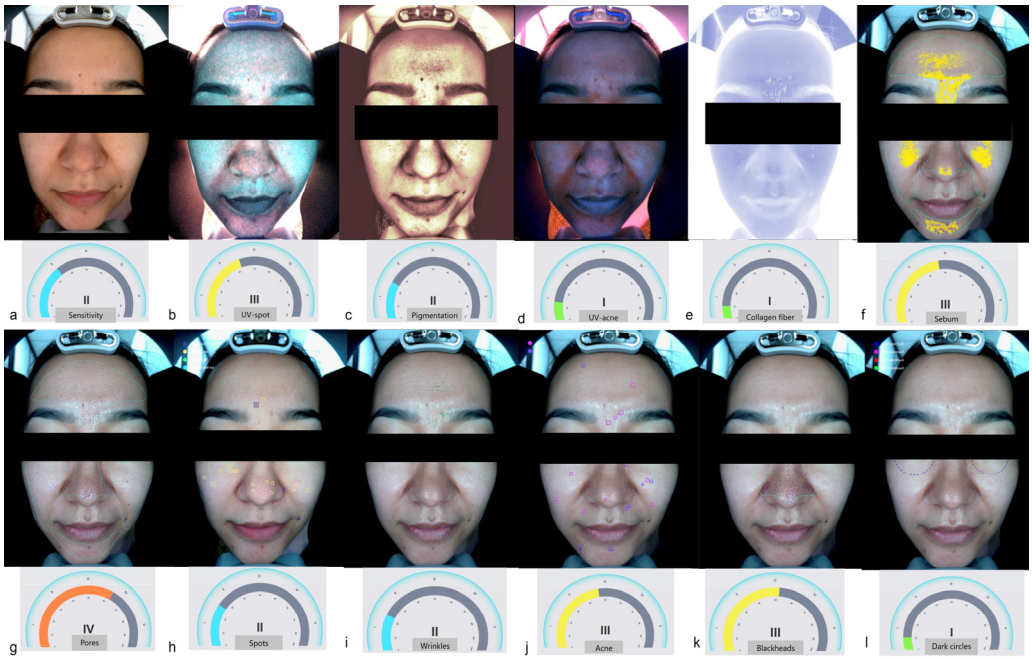

Figure 3. Skin assessment using digital images with 3D Bitmoji facial skin analyzer from Guangzhou Ideal Beauty Equipment Co., Ltd. Sensitivity (**a**) was determined by measurements of polarized light (PL spectra); UV-spot (**b**); pigmentati (**c**); UV-acne (**d**) in deep layers—by ultraviolet spectra (UV); collagen fibers (**e**); and surface measurements (**f**–**l**: sebum, pores, spots, wrinkles, acne, blackheads, dark circles under the eyes)—by RGB spectra (visible light).

In terms of sensitivity, both before and 1 month after the procedure, all patients had insensitive facial skin. Both before and after the procedure, the analyzer often gave a value higher than the actual age of the patients in terms of "facial age" (r = 0.79 and r = 0.68, respectively). As can be seen in the table, despite the fact that there was some minor improvement in the parameters, there were no statistically significant differences in all skin analyzer parameters over time and 1 month after the procedure.

Table 2. Skin analyzer readings before and 1 month after the PRP intradermal injection procedure.

Indicators *	Prior to the Procedure	One Month after the Procedure	Wilcoxon's Z-Test	*p*-Level
Skin age (years)	37.0 (34.0–48.0)	34.0 (30.0–50.0)	1.258	0.208
Age spots (number)	585.5 (492.0–658.0)	539.50 (464.0–651.0)	0.909	0.364
Wrinkles (number)	337.5 (315.0–456.0)	353.5 (282.0–407.0)	0.943	0.345
Black spots (number)	64.0 (38.0–109.0)	67.5 (32.0–102.0)	1.013	0.311
Pores (number)	608.5 (551.0–728.0)	556.0 (416.0–693.0)	1.098	0.272
Total score (on a 100-point scale)	70.0 (66.0–74.0)	70.5 (65.0–78.0)	0.196	0.845

* Median and lower–upper quartiles are given for all indicators.

3.3. Assessment of Changes in the Midface Volume, Aesthetic Improvement by the Doctor and the Patient in Dynamics 1 Month after the Procedure

One month after the procedure, 36% of the patients (13 people) noted that their facial condition had improved significantly, 66% (33 people) confirmed that their facial condition had improved somewhat, and 8% (4 people) reported no changes. The patient's assessment of aesthetic improvement had a statistically significant inverse correlation with such skin analyzer parameters as "facial skin age" and "pore count" before the procedure ($r = -0.79$ and $r = -0.94$, respectively).

After a month, the doctor assessed the visual improvement in the overall condition of the facial skin. A total of 72% of the patients (36 people) showed improvement, while 28% had no changes.

The doctor also assessed the presence/absence of improvement in the midface volume deficit over a month, as assessed using the MFVDS scale. A total of 56% of the patients (28 people) showed an improvement in this indicator, while 44% had no changes. Table 3 shows the studied indicators for which statistically significant differences were found depending on the presence/absence of an improvement in the midface volume deficit.

Table 3. Study parameters depending on the presence/absence of improvement in the midface volume after intradermal PRP injections into facial skin.

Indicators *	Improvement in the Midface Volume after a Month, as Assessed Using the MFVDS Scale		Mann–Whitney Z-Test	*p*-Level
	+	−		
Platelets before procedure ($\times 10^9$/L)	229.5 (189.0–253.5)	305.0 (261.0–361.0)	−2.747	0.006
Estradiol before procedure (pg/mL)	150,0 (62.0–248.0)	86.0 (45.0–99.0)	2.022	0.0432

* Median and lower–upper quartiles are given for all indicators.

As can be seen in Table 3, an improvement in midface volume deficit after intradermal PRP injections into facial skin is shown in the patients with lower platelet counts before the procedure and higher estradiol levels before the procedure (refer to Figure 4).

The ROC analysis was performed to determine the threshold value for platelet count and blood estradiol levels prior to the procedure, affecting the improvement of the midface volume deficit scores following the intradermal PRP injections into facial skin (refer to Table 4, Figure 5).

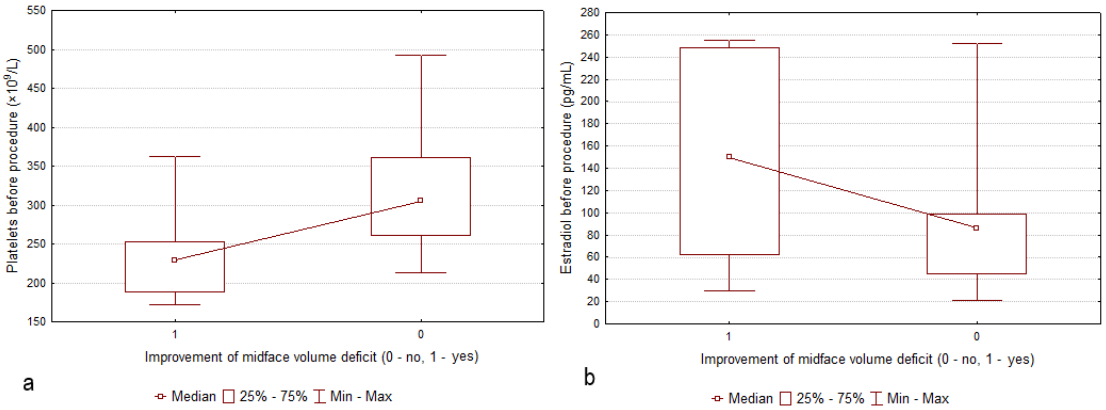

Figure 4. Platelet (**a**) and estradiol (**b**) indicators before PRP intradermal facial injections depending on the presence/absence of the midface volume deficit improvement.

Table 4. Results of ROC analysis of blood platelet counts prior to the procedure, affecting the improvement of the midface volume scores following intradermal PRP injections into facial skin.

Indicators	AUC (95% CI) *	*p*-Level	Youden's J-Index	Optimal Threshold Value	Sensitivity	Specificity
Platelets before procedure ($\times 10^9$/L)	0.824 (0.620–0.946)	0.0004	0.6026	≤259	83.33	76.92
Estradiol before procedure (pg/mL)	0.691 (0.532–0.823)	0.0204	0.4254	>99	58.33	84.21

* AUC (95% CI)—area under the ROC curve (95% CI—confidence interval).

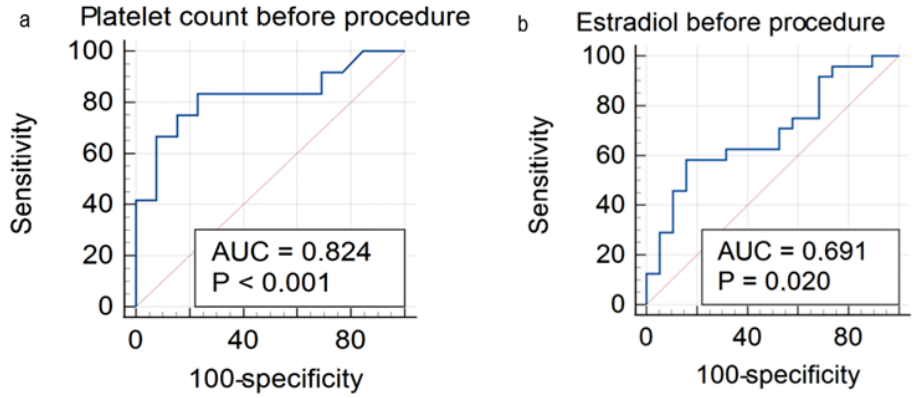

Figure 5. ROC curves of blood platelet count (**a**) and estradiol level (**b**) prior to the intradermal PRP injection procedure into facial skin versus the improvement of the midface volume after the procedure as assessed by the MFVDS score.

It has been found that patients with a platelet count ≤259 $\times$ 10^9/L would have a 16.7-fold higher chance of improving the midface volume deficit after the intradermal PRP injections into facial skin (OR 16.7, CI 2.3–122.2). Patients with serum estradiol levels >99 pg/mL would have a 6.9-fold higher chance of improving midface volume deficit after the procedure (OR 6.9, CI 1.6–30.6).

4. Discussion

The development of platelet-rich plasma to stimulate tissue repair and regeneration has been an important area of research in various fields of medicine for over 30 years [14]. The fact that PRP is an autologous product eliminates concerns about immunogenic reactions from the body. According to the conducted studies and systematic reviews, adverse events of PRP therapy, such as injection site pain, itching, infections, bleeding, nerve damage, etc.,

are minimal (less than 1%) [15–17]. In this study, no undesirable local or systemic reactions after the procedure as well as during the observed period were recorded.

Recently, computer diagnostics has been widely used not only in the field of face recognition but also in cosmetology and dermatology to assess the condition of the skin [18]. Today, modern facial skin analyzers use the technology of analyzing digital images through RGB (visible light), PL (polarized light), and UV (ultraviolet) spectra. The analyzers are equipped with an ultra-high resolution camera and the supports for the chin and forehead, which stabilize the patient's head. The obtained multispectral images of faces are analyzed using the installed software. The facial skin analyzer is a multifunctional device, thanks to which, depending on the manufacturer, it is possible to assess the texture and sensitivity of the skin, skin sebum, hydration, peeling, pore sizes, porphyrins (the presence of bacteria in the pores), wrinkles, age spots, acne, and black spots [19,20]. These days, research is actively being conducted to develop new algorithms for artificial intelligence, machine learning, and even mobile applications for diagnosing the skin's condition but a lack of high-quality and reliable research remains for the widespread introduction of these methods [21]. This study also evaluated the condition of the skin before the procedure and one month after it using the 3D Bitmoji facial skin analyzer from Guangzhou Ideal Beauty Equipment Co., Ltd. Both before and after the procedure, according to the facial skin age indicator, the analyzer often gave a value higher than the actual age of the patients ($r = 0.79$ and $r = 0.68$, respectively). Although there was slight improvement in some parameters, there were no statistically significant differences in all parameters of the skin analyzer over time, assessed a month after the procedure.

The standardized scales are important for assessing the effectiveness of the procedures used in cosmetology and dermatology, such as the global aesthetic improvement for both the doctor and the patient (subject global aesthetic improvement), as well as various subjective questionnaires on the cosmetic properties of quality and satisfaction with treatment [22]. In the study evaluating the effectiveness of pure PRP facial rejuvenation injections, 30 female participants were sequentially administered PRP in two sessions at 3-month intervals. The evaluation was performed by comparing measurements of skin scans before and after and the photos before and after by a dermatologist and blindly by a second physician. There was also a subjective evaluation by the participants; after 3 and 6 months of follow-up, statistically significant improvements noted by both the patient, the treating dermatologist, and the second independent expert were displayed in the severity criterion of periorbital dark circles. Yet, no differences were found in the other criteria (periorbital wrinkles or nasolabial folds) [23]. In one review involving 24 studies with PRP (including 8 randomized controlled trials involving 480 patients), an overall physician's assessment showed that injectable PRP monotherapy caused moderate improvements (at least temporarily) in facial skin appearance, texture, and wrinkles, periorbital wrinkles, and pigmentation became less pronounced [24]. In most studies, the authors note at least minor improvements after the PRP administration procedure, both from the physician's assessment and the patients. In this study, 1 month after the procedure, 36% of the patients noted that their facial skin had improved significantly, 66% confirmed their facial skin had improved, and 8% reported no changes. In total, 72% of the patients assessed by the physician had visual improvement in the overall skin condition, and 56% of the patients had improvement in the midface volume.

In the study by I. Majid and R. Timungpi [25] in 76% of cases, improvement was noted after the first session of PRP administration for all clinical parameters. In another study, visible improvement was obtained after an average of 1.5 sessions of PRP administration [26]. Studies have shown that some conditions may require a single procedure, others may be effective after several sessions, and the ideal interval between procedures has not been determined [27]. According to some authors, the objective data on skin improvement after PRP injections were modest (up to 50%) but subjective patient satisfaction was high. Also, improvement even after a series of procedures usually lasted 3–6 months with a gradual return to the initial level [24,28]. Since the optimal dosage and frequency of PRP

administration have not yet been standardized and established, further research is needed to study the minimum number of procedures required and to determine the optimal period between them to achieve the maximum effect.

There are many factors that can affect the effectiveness of PRP injections into facial skin. In this article, we have considered several. Insulin is important in maintaining the extracellular matrix. It stimulates the formation of type I and type III collagen. According to different studies, the collagen content of skin and vascular tissue is decreased in diabetes. Insulin is involved in collagen synthesis regulation at different stages: participating in collagen crosslinking and influencing the number and the type of crosslinks in collagen fibrils. In addition, insulin-induced alterations in the extracellular matrix may include morphological changes as increased collagen fiber density in the dermis and basement membrane thickening along with skin thickening and induration [29,30]. All these of course affect the quality of the skin and the effectiveness of cosmetology procedures. Therefore, in this study, serum insulin was determined prior to the procedure. Insulin levels in all the subjects were within the normal range, thus, it could not affect the assessment of the procedure's effectiveness.

Estradiol is a major regulating factor in skin aging; estradiol deficiency is a key intrinsic contributor to skin aging [31]. Menopause leads to accelerated degradation of the dermal matrix where skin collagen reduces and sweat gland and sebaceous gland function decrease leading to drier, less hydrated, thin skin with wrinkles and sagging [32,33]. Therefore, at low concentrations of estradiol, hormone replacement therapy (HRT) is sometimes used. Patients on HRT exhibit thicker, more hydrated skin with fewer wrinkles versus those not on HRT. HRT also increases collagen and elastin content, improving skin recoil [32]. In this study, serum estradiol levels were determined in all patients prior to the procedure in the follicular phase of the menstrual cycle to identify its possible influence on the effectiveness of PRP injections into facial skin. Blood estradiol levels were slightly elevated in 16 patients (ranging from 184.8 to 255 pg/mL), no patients with low estradiol concentrations were identified. These results exclude a negative effect of low estradiol concentrations on the condition of the facial skin before the procedure and on the evaluation of the procedure's effectiveness. This study also confirmed that estradiol is an important factor affecting the condition of skin. It has been found that after intradermal PRP injections into facial skin, improvements in the midface volume scores—as assessed by the MFVDS scale—were found in the patients with higher pre-procedure estradiol levels. It was determined that with serum estradiol levels >99 pg/mL, there was a 6.9 times greater chance of midface volume improvement than with lower estradiol levels.

Some researchers suggest that high platelet levels increase thrombotic risk [34]. Platelets are offered as a possible link between inflammatory and pro-coagulant states. Platelet aggregation, degranulation, and small vessel platelet thrombosis may cause a loose endothelial barrier and leak proinflammatory cytokines [35]. Platelet activation occurs in some skin inflammatory disorders (atopic dermatitis and psoriasis), and the increase in D-dimer was noticed in patients with skin disorders like chronic spontaneous urticaria, angioedema, and bullous pemphigoid [34,36–38]. Hypercoagulation can play a local pathogenic role in inducing skin lesions by increasing endothelial vascular permeability and a systemic role in increasing the risk of thrombosis [39]. Therefore, in this study, we also examined the state of the coagulation system to exclude patients with hypercoagulation, possible microthrombosis, and to reduce the possibility of side effects. In 16 patients, blood platelets were elevated (329–492 $\times$ 10^9/L) but the D-dimer level in all patients was within the normal range. It is also worth noting that in the given study, after intradermal PRP injections into facial skin, patients with lower pre-procedure platelet counts showed an improvement in the midface volume, as measured by the MFVDS scale. It has been found that after intradermal injections of PRP into the facial skin, if the pre-procedure platelet count was $\leq$259 $\times$ 10^9/L, the chance of improvement of the midface volume was 16.7 times higher. This might indicate that at this level of platelets, one can observe better blood rheology

and microcirculation of the skin, less risk of microthrombus formation, and increase in the vascular wall.

Since we injected the PRP to a depth of 4–6 mm, it also affected the state of the subcutaneous fat. According to some studies, PRP in the subcutaneous fat promotes angiogenesis and adipogenesis through the insulin-like growth factor 1 receptor/extracellular signal-regulated kinase signaling pathway [40]. This can improve the quality of the subcutaneous fat layer, affecting the volume of the face, namely in the temporal and parotid region, which improves the signs of aging, and gives a lifting effect of the middle third of the face. However, further studies of the effects of PRP on subcutaneous fat are needed.

In this connection, we recommend an examination algorithm before the procedure of PRP injections into facial skin, which includes a complete blood count with the determination of lymphocytes, monocytes, platelets, D-dimer, and a thorough history taking. This algorithm is needed for admission to the procedure in order to minimize the possible side effects and to predict positive effects from the procedure.

The potential limitations of this pilot study may be the small number of patients studied, the short observation period, lack of a control group, a small set of studied parameters, and the lack of possibility to study the frequency and intervals of the procedure to obtain the best effect—both subjective and objective. Larger prospective studies are needed in this field.

5. Conclusions

This study focused on the effectiveness of PRP injections into facial skin, and no undesirable local effects were detected after the procedure. According to the Global Aesthetic Improvement Scale, both from the doctor and the patients, the majority noted an improvement in the skin condition after the procedure; however, according to the skin analyzer data, there were no statistically significant changes. It is important to remember that the effectiveness of the procedure can be affected by many factors. Therefore, to minimize the occurrence of side effects and predict a positive effect from the procedure, some routine tests are recommended to be conducted before the procedure. These tests include a complete blood count with the determination of lymphocytes, monocytes, platelets, and D-dimer, and a thorough history taking. PRP injections are a minimally invasive method compared to, for example, plastic surgery, and the advantages of using PRP are its availability, low cost, ease of use, and relative safety for many patients. Since this study had some limitations, larger prospective studies are needed, taking into account a large sample, longer follow-up period, multiplicity of the procedure, its combination with other cosmetic effects, and more in-depth study of the systemic effects of PRP injections.

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Data Availability Statement: The data supporting this study's findings are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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