

Chemical Biostimulation of Labial Majora: First Clinical Insights

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Introduction: Aesthetic gynecology procedures have been gaining growing interest among patients seeking improvement in the appearance, elasticity, and hydration of the external genitalia. A rising number of individuals attending aesthetic dermatology clinics request minimally invasive treatment options to enhance the quality of genital skin. This study presents preliminary findings on a novel formulation for chemical biostimulation of labial skin, designed to improve tissue firmness and structural integrity.

Methods: A pilot study was conducted to assess the clinical outcomes of a chemical biostimulation protocol performed on the external genital area. The primary endpoints were improvement in skin tension and thickness. High-frequency ultrasound imaging was employed as a quantitative tool for evaluating tissue hydration.

Results: The treatment protocol led to a visible enhancement in tissue firmness and hydration. No significant effect was observed in relation to skin pigmentation. High-frequency ultrasound provided consistent and reliable measurements of tissue hydration, confirming its usefulness as an objective assessment method in aesthetic gynecology.

Discussion: The pilot data support the potential of chemical biostimulation as a minimally invasive option for improving genital skin quality. Furthermore, high-frequency ultrasound appears to be a valuable adjunct in the objective evaluation of treatment effects. These preliminary results warrant further investigation in larger clinical trials.

Keywords: labia chemical biostimulation, vaginal laxity, vaginal rejuvenation, aesthetic gynaecology

Introduction

In recent years, aesthetic gynecology procedures have been gaining increasing popularity, both among patients and within clinical practice. Many interventions classified under the umbrella of aesthetic gynecology aim not only to enhance the visual appearance of the genital area but also to improve patients' physical and psychological comfort. These improvements are often achieved through enhanced skin and mucosal firmness, reduction of discomfort during physical activity or sexual intercourse, and alleviation of vaginal dryness.

Among the most commonly employed techniques in aesthetic gynecology are laser therapy, radiofrequency (RF) treatments, and high-intensity focused ultrasound (HIFU), particularly when applied to the vaginal walls. The primary goals of these modalities include improving vaginal wall tension, increasing mucosal thickness, and enhancing tissue hydration. In selected cases, such interventions are also used to reduce symptoms of mild stress urinary incontinence.^{1–5}

Regarding the external genitalia, many patients express a desire to improve skin hydration and firmness in the labial area. Vaginal and vulvar dryness, as well as mucocutaneous atrophy, are particularly prevalent in peri- and postmenopausal women. Reduced firmness and moisture of the labia may result in friction-related injuries during sports or sexual activity, which in turn can increase the susceptibility to infections and overall discomfort.^{4–10}

In addition to technologies that utilize physical energy sources, such as lasers or radiofrequency, aesthetic gynecology also includes the use of topical or injectable agents whose effects are based on the pharmacodynamic properties of their

active ingredients. These formulations may be administered via intradermal needle mesotherapy or applied directly to the skin or mucous membranes.^{11–16} In the case of topical application, both the composition and physicochemical form of the product play a crucial role in facilitating the transdermal or transmucosal penetration of active substances.

The tested formulation is a novel product intended for chemical biostimulation of the skin in the intimate area – PRX-T Lady (WIQO, Italy). It has recently been introduced to the European market as a Class I medical device, CE-certified. The objective of the treatment is to induce controlled chemical biostimulation of the genital skin, aiming to improve its firmness, elasticity, and dermal density. The formulation contains the following active components: trichloroacetic acid (TCA), which promotes neocollagenesis and ne elastogenesis by stimulating dermal fibroblasts; hydrogen peroxide¹⁷ (H₂O₂), which modulates cellular receptor activation and enhances tissue responsiveness to growth factor¹⁸ and kojic acid, a well-established agent with depigmenting properties. This combination is designed to elicit synergistic effects in skin rejuvenation, without the need for mechanical disruption of the epidermis.¹⁹

The mechanism of action of the tested product differs fundamentally from that of conventional chemical peels. Stabilization of trichloroacetic acid (TCA) with hydrogen peroxide (H₂O₂) significantly reduces the aggressive exfoliative activity of TCA at the epidermal level. This modification limits protein coagulation and avoids overt epidermal peeling. In contrast, at the level of the dermis, TCA retains its biostimulatory potential by activating fibroblasts and promoting the synthesis of collagen and other extracellular matrix (ECM) components.¹⁸

The aim of the preliminary study was to determine the effectiveness of the firming treatment using a new product for genital skin chemical biostimulation.

Materials and Methods

The effectiveness of the firming treatment performed with the use of product for genital skin chemical biostimulation (PRX-T Lady (WIQO, Italy)) in the area of the labia majora has been evaluated. The study involved 27 women of the average age of 53.47 ± 4.26 years that reported discomfort associated with the loss of skin firmness and/or excessive skin dryness in the above-mentioned area. The participants were recruited at the gynecology clinic “ArtesMed” Medical Center in Katowice between January and June 2024. The detailed inclusion criteria comprised adult women aged 45–65 years who reported concerns regarding the quality of labial skin. The exclusion criteria included current genital infections, active dermatological disease in the treatment area, pregnancy, breastfeeding, allergy to the product components (kojic acid, trichloroacetic acid, hydrogen peroxide), as well as abnormal gynecological bleeding or menstruation at the time of the intervention. Patients who had undergone aesthetic procedures in the genital area within the previous 6 months were also excluded. All participants completed a dedicated medical questionnaire documenting their current health status, complete gynecological history (number of deliveries, type of delivery, gynecological diseases, previous procedures in the genital area), and physical examination. Ethnic origin was recorded; all participants were Caucasian.

The research was carried out after obtaining the written consent of volunteers who were familiarized with the purpose of the research and its course, and with the consent of the Ethics Committee of the Medical University of Silesia No. PCN/CBN/0022/KB1/27/III/16/17/21. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Before a series of 4 treatments with the use of product for genital skin chemical biostimulation, each participant had a medical interview and contraindications for the planned treatment were excluded. Additionally, photographic documentation in standard conditions was created. It also has to be mentioned that all patients expressed their written consent to take part in the study and the series of 4 treatments mentioned above. Written consent was also obtained for the publication of photographic documentation in scientific journals. Treatments were carried out in accordance with the standard treatment protocol obtained from the preparation producer. The first step was to cleanse the patient’s skin with a product designed to balance the skin’s pH. Then, 2–4 layers of the chemical biostimulation product for genital skin were applied. Each layer was massaged with long, sliding movements from distal to proximal (from the lower part of the labia upwards) for 20–40 seconds per layer, continuing until the gel was fully absorbed (which usually corresponded to the disappearance of the layer). The number of layers was determined based on visual assessment. The application was completed once a visible improvement in tissue firmness was achieved. Next, the skin was cleaned with cold water and dried with a paper towel, and later, as a next step, a regenerating cream dedicated to this type of treatment was applied.

The overall level of patient satisfaction was assessed 14 days after the treatment series using a self-assessment questionnaire (Figure S1 and S2). The questionnaire included 10-point Likert scale questions evaluating overall satisfaction (1 = lowest, 10 = highest), firmness (1 = minimal, 10 = maximal), and labial brightness (1 = darkest, 10 = lightest). In addition, participants reported any adverse events and changes in dryness. High-frequency ultrasound imaging was used for the objective measurement of local skin hydration.

The ultrasound scans were recorded using a high-resolution DUB Skin Scanner 75 ultrasound machine, manufactured by TPM, Germany. In this study, a 33MHz probe was used, and the imaging depth was 8 mm. Recorded image parameters: resolution 1024×384 pixels, color depth of 256 bits. 40dB gain. The image was recorded in the form of a B-scan (two-dimensional).

The possibility of using high-frequency ultrasound to measure the degree of tissue hydration is based on the principle that tissue echogenicity depends on the water content. The less water the tissue contains, the more strongly it reflects the ultrasound. On the other hand, tissues containing more water are more hypoechoic - they absorb ultrasounds more effectively. The ultrasound image (B-scan) is a two-dimensional representation of tissue echogenicity, where this parameter is most often visualized using the brightness of the image. The brighter the image, the more hyperechoic tissue is, so it contains less water.

54 ultrasound scans (2 time points for 27 volunteers) were recorded and analyzed. Brightness analysis of ultrasound images was performed in an application developed in ImageJ 1.52a, National Institute of Health, USA. Before the image brightness was determined, all captured images were normalized. The normalization of the recorded images consisted in identifying the brightest and darkest pixel in the entire set of recorded images. The lightest pixel was assigned the brightness 0, and the darkest - 255 (the brightness was identified for 8-bit images, so in the range 0–255). It allowed to bring the changes in pixel brightness to the full range of gray levels.

In each image, ROI (region of interest) corresponding to the labia was arbitrarily designated. For each ROI, a histogram was recorded, which allowed to determine the average brightness corresponding to the echogenicity, and thus indirectly the water content in the ROI area and the change of this parameter after the series of treatments.

Results

General Satisfaction with the Performed Treatments

Based on the analysis of satisfaction questionnaires (Figures S1 and S2) completed by patients before and after the treatment series, the following preliminary conclusions were drawn. Prior to the intervention, only 29.63% of patients reported general satisfaction with the appearance of their labia. Fourteen days after completing the series of four treatments, all participants reported improvement in their satisfaction regarding the appearance of the labia, and as many as 60.37% declared being generally satisfied with their appearance following the procedures (Figure 1).

Figure 2 presents the appearance of the volunteer's labia before and 14 days after the treatment series. The image demonstrates an improvement in labial skin tension.

Firmness

According to patient self-assessments, skin firmness in the labial area increased following the treatment series. The average reported improvement in firmness was 76±26%.

Patients were also asked about the impact of labial skin laxity on their quality of everyday life. A total of 88.89% of respondents indicated that reduced labial firmness negatively affected various aspects of daily functioning, including work, study, hobbies, and physical activity. Notably, the same proportion (88.89%) reported an improvement in daily life quality following the treatment series.

Regarding the quality of sexual life, 81.48% of patients stated that diminished labial firmness had a negative effect on their sexual experience. After completing the full course of treatments, 88.89% of participants reported a noticeable improvement in this domain.

Additionally, the participants were asked to what extent the reduction in labial firmness influenced their emotional well-being, including symptoms such as irritability, nervousness, low mood, and decreased self-esteem. It should also be noted that 70.37% of patients reported that the loss of labial firmness had a negative impact on their emotional state,

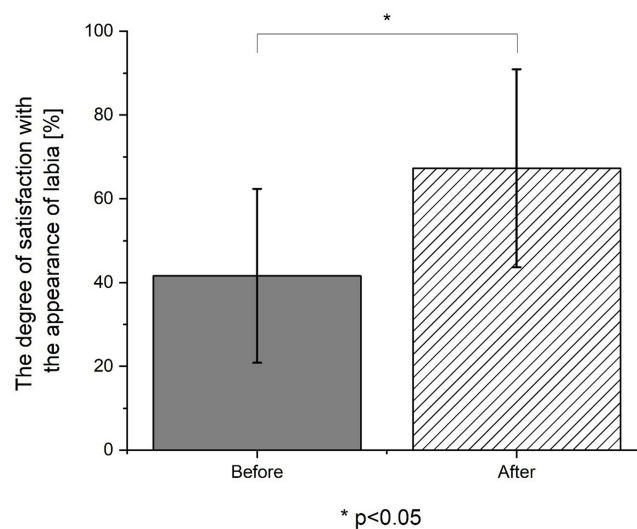


Figure 1 The degree of satisfaction with the appearance of labia before and after chemical biostimulation.

Note: * $p < 0.05$.

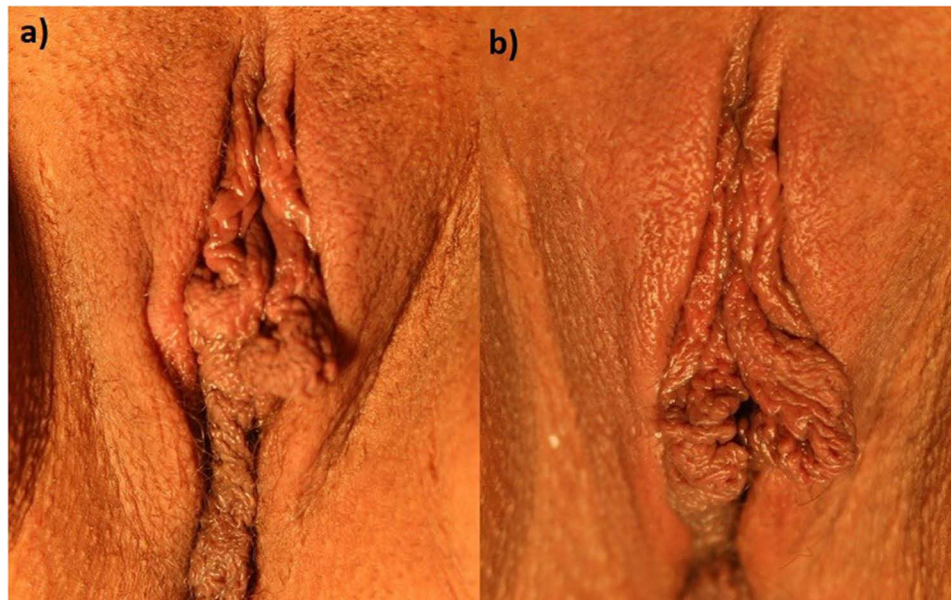


Figure 2 Patient 1 before (a) and after (b) chemical skin biostimulation treatments.

including symptoms such as irritability, low mood, and reduced self-esteem. Following the treatment series, 81.48% of participants observed an improvement in this domain. Importantly, 100% of the patients declared overall satisfaction with the outcomes achieved after completing the four treatment sessions. Two patients reported experiencing intense smarting sensations during the procedure, while three patients experienced epidermal exfoliation in the treated area. Additionally, 51.85% of patients observed skin lightening in the treated region following the completion of the treatment series.

Color

The application of the tested preparation did not result in a significant change in labial skin color. Despite the relatively high concentration of kojic acid, known for its strong depigmenting properties, no noticeable lightening effect was observed. This lack of change was confirmed both subjectively (by the patients themselves) and objectively using image

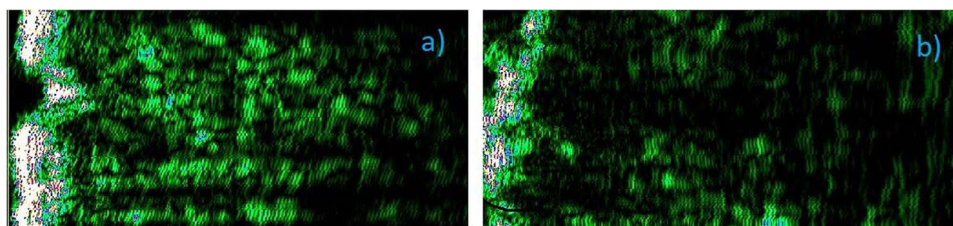


Figure 3 Ultrasound image of patient 1 before treatment (a) and 2 weeks after a series of 4 chemical skin stimulation procedures (b).

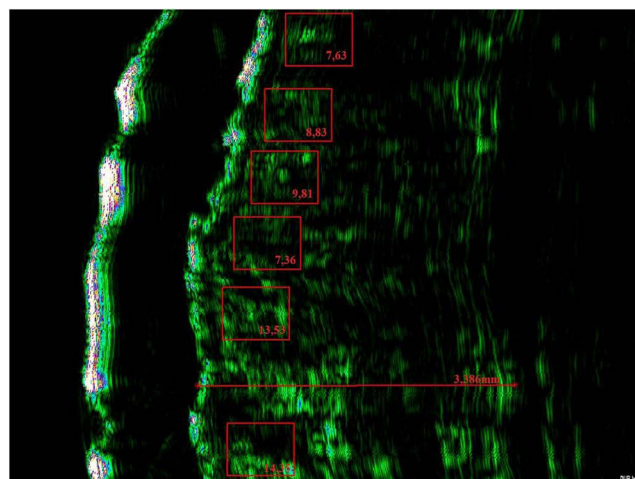


Figure 4 An exemplary ultrasound scan of patient nr 1 that is the basis for determining the degree of hydration of the labia before and after the chemical stimulation procedure.

Note: Red boxes with values indicate ROI. Red line indicates tissue thickness.

analysis techniques. The applied methods of digital image processing did not reveal any measurable alterations in any of the analyzed RGB color channels (red, green, blue).

Hydration

Hydration was assessed using high-frequency ultrasound (HFUS) with a 33 MHz probe, based on the principle that tissue echogenicity—quantified as pixel brightness in the ultrasound image—is inversely related to water content. In this model, brighter areas indicate lower hydration, whereas darker (hypoechoic) regions suggest higher water content (Figure 3). The mean brightness value of the region of interest (ROI) covering the labial area (Figure 4) prior to the treatment series was 26.94 ± 9.34 . Brightness was measured on an 8-bit grayscale scale, where 0 corresponds to black and 255 to white.

Following the series of biostimulating treatments, the mean brightness value decreased to 16.21 ± 8.24 , representing an average reduction of nearly 40%, which is consistent with a significant increase in tissue hydration.

Discussion

The results of this preliminary study suggest that chemical biostimulation of the labial skin using a topical formulation containing trichloroacetic acid, hydrogen peroxide, and kojic acid may be a promising approach for improving tissue firmness and hydration in the external genital area. The observed improvements in tissue tone and elasticity were consistent across subjective patient reports and objective ultrasound measurements, indicating that the procedure provides both perceived and quantifiable benefits. This type of treatment is well tolerated by patients, as it does not exclude them from carrying out a “normal everyday life” and professional activity. One shall also take into consideration that more sensitive patients may experience skin irritation, disappearing after using dedicated, regenerating cream, and temporary exfoliation of the epidermis.

The significant increase in hydration, as measured by a decrease in ultrasound echogenicity, supports earlier experimental evidence indicating that low concentrations of hydrogen peroxide can stimulate fibroblast activity and extracellular matrix remodeling.^{17,18} Moreover, the lack of epidermal protein coagulation or visible “frosting” distinguishes this biostimulation method from classical TCA-based chemical peels, which tend to produce more aggressive and exfoliative effects. This property likely contributes to the procedure’s high tolerability and minimal downtime, which is essential for treatments performed in intimate anatomical areas.

The study also demonstrates the potential of high-frequency ultrasound (HFUS) as a non-invasive, reproducible, and quantitative tool for assessing tissue hydration in aesthetic gynecology. At the same time, it should be emphasized that hydration was identified as a change in image brightness. Both the neocollagenesis process and the increase in tissue hydration will be responsible for changing the brightness of the image. In order to distinguish between these two processes, the change of hydration in the conducted research model is understood as changes in brightness only within the epidermis.

Traditional corneometry, though widely used in dermatology, is not suitable for vulvar assessment due to anatomical and methodological constraints.¹⁹ Corneometer measuring the conductance of the epidermis is very sensitive to changes in the water content on the tested surface, which makes it impossible to use it in this anatomical location. In contrast, HFUS enables indirect measurement of water content based on echogenicity and may serve as a standard method in future clinical trials evaluating mucocutaneous hydration.^{20–24}

Despite the inclusion of kojic acid, no significant changes in pigmentation were observed, even using sensitive RGB image analysis techniques. This may reflect the inherent resistance of vulvar melanocytes to depigmenting agents, as previously suggested by studies on intimate area pigmentation.²⁵ Moreover, the psychological importance of genital aesthetics-particularly skin tone and perceived youthfulness-has been increasingly recognized, which underscores the need for alternative or adjunctive depigmentation strategies in this anatomical region.

Literature data indicate that significantly better lightening effects can be achieved with fractional CO₂ lasers.^{26,27} In the study by Cihantimur et al,¹⁵ which included a group of 124 patients, a very high satisfaction rate of over 90% was obtained with the combined use of surgical labiaplasty, autologous fat augmentation, and labial lightening with a CO₂ laser. In the context of improving labial firmness, it is difficult to find reports in medical databases regarding the use of chemical skin stimulators. In our preliminary observations, the satisfaction rate among volunteers was high, reaching nearly 89%. Similarly high satisfaction with labial firming procedures using radiofrequency was reported by Steven et al.²⁸ Among the studied volunteers, as many as 67% were satisfied with tissue firmness improvement after five radiofrequency sessions. In the study by Lalji et al,²⁹ evaluating the efficacy of monopolar radiofrequency in vaginal and vulvar tightening and in reducing stress urinary incontinence, significant improvements were achieved in both the reduction of incontinence symptoms and the firmness of the vagina and labia. Moreover, the vast majority of patients reported an improvement in intimate life. Reports can also be found in medical databases regarding the use of non-cross-linked hyaluronic acid combined with antioxidants³⁰ to improve tissue tone in the vagina and labia. However, a far more popular method of labial firming is the use of fillers with cross-linked hyaluronic acid.^{11,12,16}

From a clinical standpoint, the improvement in quality of life and sexual well-being reported by participants is noteworthy. Nearly 90% of patients observed positive changes in both domains, which may be attributed not only to mechanical skin improvements, but also to psychosocial effects related to enhanced body image and self-confidence. Similarly good results have been reported with the use of fillers based on hyaluronic acid and calcium hydroxyapatite.^{11,12,16}

Study Limitation

This study is not without limitations. The small sample size, lack of a control group, and short follow-up period restrict the generalizability of the findings. In addition, quantification of collagen remodeling was not performed, which limits our ability to distinguish the contribution of neocollagenesis from hydration effects. Future studies should incorporate histological or biochemical markers of tissue remodeling, longer-term follow-up, and potentially compare different formulations or methods of biostimulation.

Initial Conclusions

Initial observations indicate that treatments using product for genital skin chemical biostimulation may be considered an effective method of firming up the major labia.

Moreover, the performed treatments increase the hydration of the labia, which was confirmed by the ultrasound method. The proposed methodology for assessing the hydration of the labia is a result of difficulties in using the classically used corneometry in dermatology. The proposed methodology shows a significant improvement in hydration, which was also confirmed in the survey research.

Despite the relatively sensitive color assessment based on the analysis and processing of images of the acquired photos, the procedure did not cause any changes in the color of the labia, despite the presence of kojic acid, which is a relatively strong tyrosinase inhibitor, in the formulation.

To sum up, the applied procedure resulted in a marked improvement in the parameters of the labia in terms of tension and hydration, but it did not affect the color, and the proposed method of using high-frequency ultrasound is an effective quantitative technique allowing the measurement of tissue hydration in the course of aesthetic gynecology procedures.

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Disclosure

The authors report no conflicts of interest in this work.

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