

# Diode Laser Bio stimulation Reduces Post-Injection Edema Following Juvéderm Ultra 3 Lip Augmentation: A Randomized Controlled Trial with 3D Evaluation

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## *Abstract*

### **Background:**

Post-filler edema can obscure aesthetic outcomes and affect patient satisfaction. This RCT investigates the effect of diode laser bio stimulation in reducing edema after Juvéderm Ultra 3 lip injections using 3D imaging.

### **Methods:**

1. Thirty female patients were randomly assigned to receive diode laser (810 nm, Elexxion Pico) bio stimulation post-injection or no laser.
2. Lip volume was measured using Crisalix 3D imaging at baseline, immediately post-injection, 1 week, and 1 month.

### **Results:**

Laser treatment significantly reduced lip edema at immediate and 1-week timepoints ( $p < 0.01$ ), with similar final volumes by 1 month.

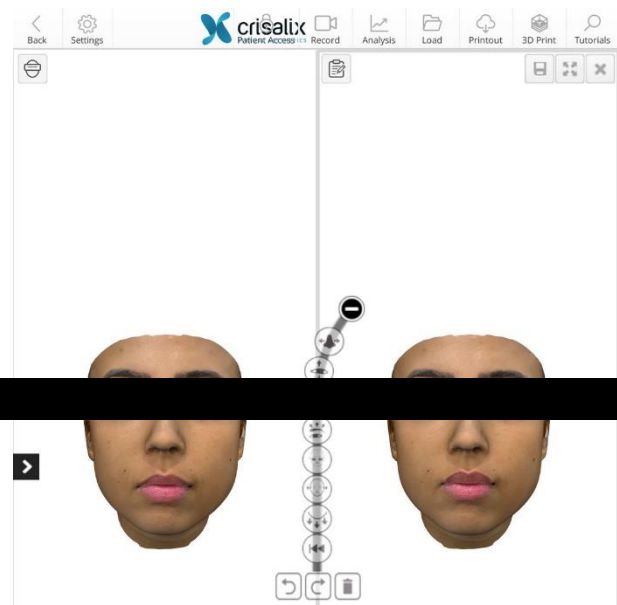
### **Conclusion:**

Diode laser bio stimulation effectively reduces early post-filler edema, enhancing recovery and patient satisfaction.

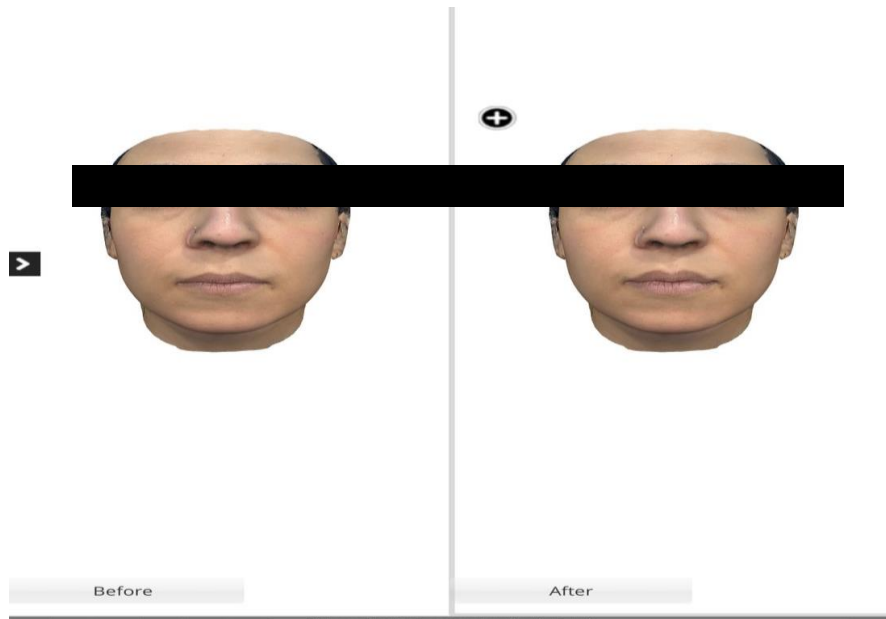
**Level of Evidence:** I

## *Introduction*

- Lip augmentation with HA fillers like Juvéderm Ultra 3 remains one of the most popular non-surgical aesthetic treatments [1]. Post-injection edema is common, typically peaking within hours and resolving over 1–2 weeks [2]. This transient swelling can distort results and contribute to patient anxiety [3].



- Low-level laser therapy (LLLT), or laser bio stimulation, uses specific wavelengths to promote healing, reduce inflammation, and modulate lymphatic flow [4]. It has shown promise in accelerating recovery in dermatologic and surgical procedures [5,6], yet its application in aesthetic injectables remains underexplored.



- This study evaluates whether diode laser bio stimulation (810 nm) reduces early edema after Juvéderm Ultra 3 lip filler injection using objective 3D volumetric analysis with Crisalix.



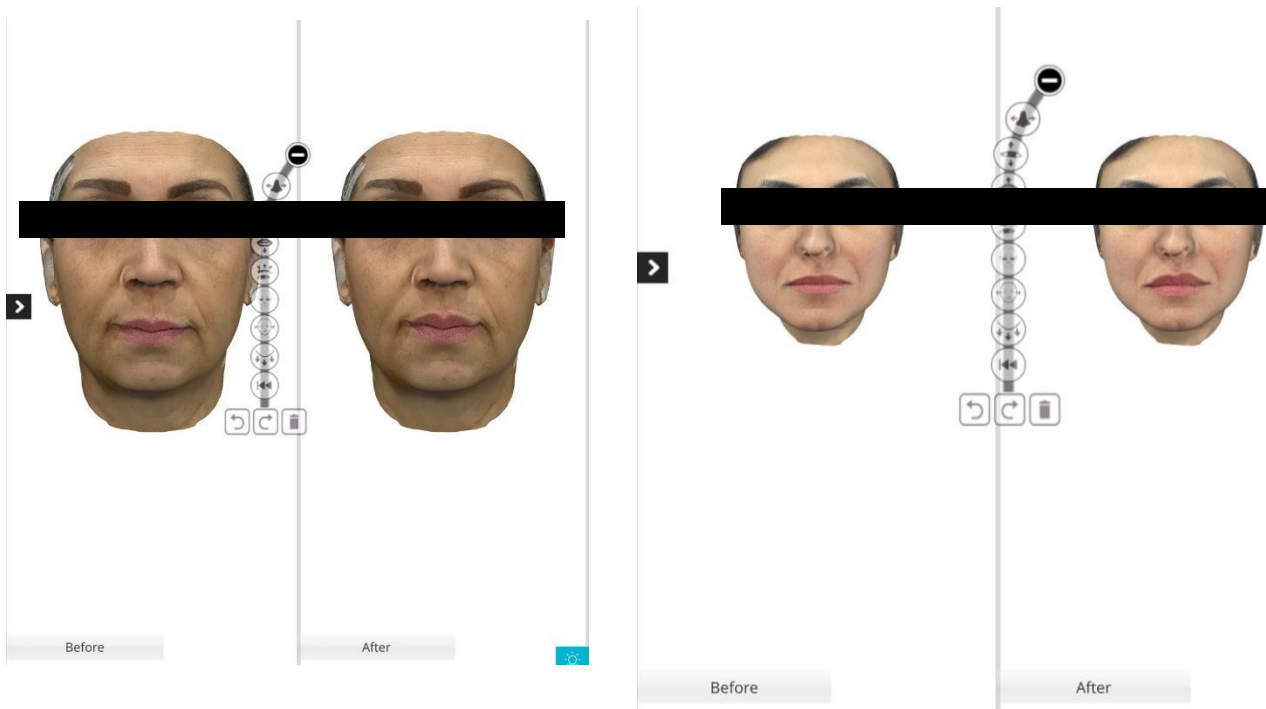
## Materials and Methods

### Study Design

Prospective, single-blinded randomized controlled trial, conducted at Alamein Hospital, January–March 2025. Ethical approval and informed consent obtained.

### Participants

- Inclusion: Female patients aged 21–45 seeking first-time lip augmentation.
- Exclusion: Recent filler use, smoking, systemic disease, anticoagulants, or local infection.



## *Randomization & Groups*

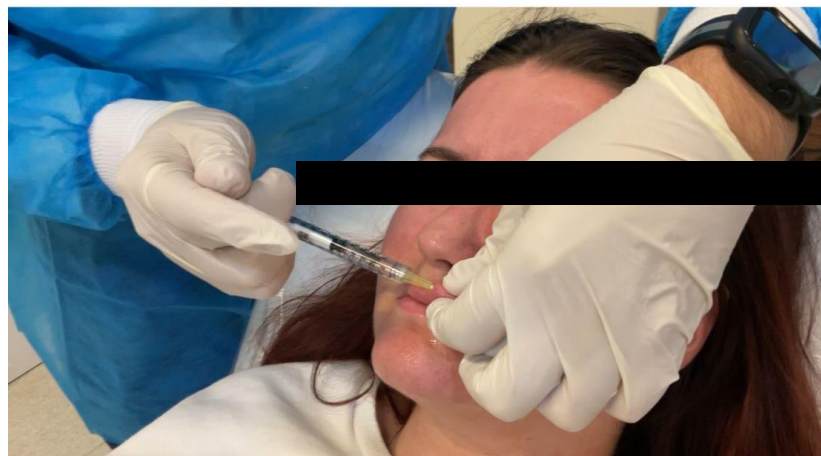
Random allocation into:

- **Laser Group (n=15):** Received diode laser bio stimulation immediately post-injection.
- **Control Group (n=15):** Received filler only, no adjunct treatment.

## *Procedure*

All patients received 1 ml Juvéderm Ultra 3 via linear threading into upper and lower lips.

- **Laser Settings:** Elexxion Pico, 810 nm, continuous mode, 1.5 W, 60 s/quadrant (total 4 minutes), extraoral circular motion.





## Evaluation Protocol

### Crisalix 3D Imaging at:

- T0 – Pre-injection (baseline)
- T1 – Immediate post-injection (~15 min)
- T2 – 1 week post-injection
- T3 – 1 month post-injection

Lip volume measured in mm<sup>3</sup>. Swelling calculated as % increase from T0.

### Outcomes

- **Primary:** % edema reduction at T1 and T2.
- **Secondary:** Patient-rated swelling (VAS, 0–10), satisfaction at T2 and T3.

### Statistical Analysis

SPSS v27. Independent t-tests for group comparisons. Significance at  $p < 0.05$ .

## Results

### Participant Data

All 30 patients completed follow-up. Mean age: 31.4  $\pm$ 6.8 years. No adverse events.

### Volumetric Edema

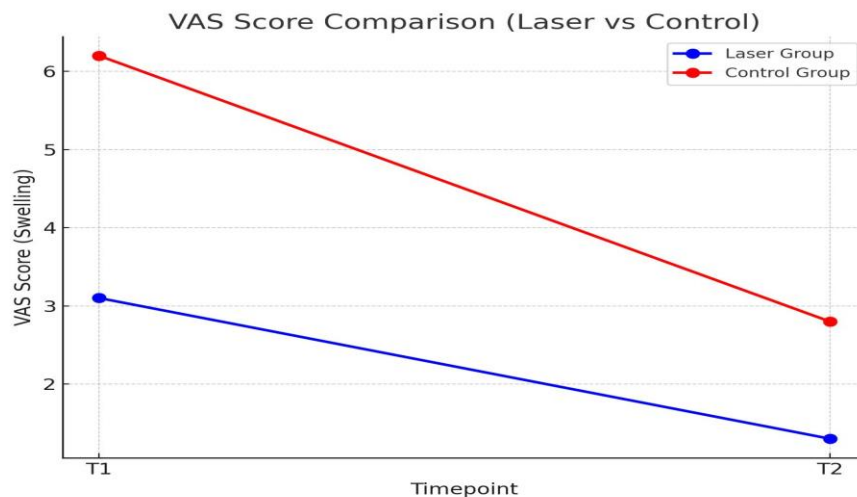
- **T1:** Laser = 18.4%  $\pm$ 3.2%, Control = 28.9%  $\pm$ 4.1% ( $p < 0.001$ )

- **T2:** Laser = 8.1%, Control = 13.5% ( $p = 0.002$ )
- **T3:** Both groups stabilized at ~13% volume retention, with no statistical difference.

### VAS Scores

- T1: Laser = 3.1  $\pm$ 0.7, Control = 6.2  $\pm$ 1.1 ( $p < 0.001$ )
- T2: Laser = 1.3  $\pm$ 0.5, Control = 2.8  $\pm$ 0.9 ( $p = 0.02$ )

Patient satisfaction was higher in the laser group at all timepoints.



### Discussion

This RCT demonstrates that diode laser bio stimulation significantly reduces early edema after lip filler injection. The use of Crisalix 3D scanning allowed precise volumetric monitoring, revealing nearly 36% less swelling in the laser group at T1. These findings align with previous research supporting LLLT in modulating inflammation and accelerating lymphatic drainage [4–6].

**Our results suggest that adding a 4-minute bio stimulation protocol post-filler is a simple and effective intervention to improve recovery.**

### Limitations:

- All-female cohort
- Short follow-up
- Single filler type and injection protocol  
Future studies should explore long-term tissue effects and applications to other facial regions.

## Conclusion

Diode laser bio stimulation significantly reduces early edema following Juvéderm Ultra 3 lip augmentation. The combination of objective Crisalix imaging and patient-reported outcomes supports its role in optimizing aesthetic injectable protocols.

## References

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