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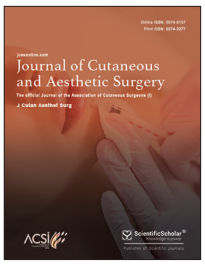

Original Article

Enhancing lip esthetics: Investigating lip volume, texture, and color with liplase treatment

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ABSTRACT

Objectives: This study evaluates the safety and efficacy of Liplase® treatment in improving lip volume, color, and texture among skin of color patients, with additional outcomes such as patient and physician satisfaction and pain assessment.

Material and Methods: A prospective, interventional study was conducted on 15 patients (aged 18–54) with skin of color over 6 months. The treatment utilized Erbium-doped Yttrium Aluminum Garnet (Er:YAG) and Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) lasers with intraoral and extraoral passes, repeated monthly for three sessions. Baseline and follow-up assessments included 3D imaging, colorimetry, and satisfaction scores. Pain was assessed using the visual analogue scale (VAS).

Results: Thirteen patients completed the study. Improvements in lip color, texture, volume, and a decrease in wrinkles were observed, with a reduction in melanin and increased erythema scores in 11 patients. Satisfaction scores revealed 100% improvement in lip color, 76.9% in texture, and 53% in volume. Physician ratings corroborated these findings. Pain scores varied, with most patients reporting mild-to-moderate discomfort. Minimal downtime, characterized by peeling, was managed effectively with moisturizers. The treatment was well-tolerated with manageable downtime.

Conclusion: This study underscores Liplase® as a safe and effective method for lip rejuvenation, particularly in the skin of the color demographic.

Keywords: Colorimetry, Lip esthetics, Lip augmentation, Lip color enhancement, Lip rejuvenation, Lip texture, Liplase, Quantification 3D

INTRODUCTION

Lip esthetics significantly influence a youthful look and attractiveness.[1] Ideal lips are characterized by symmetry, a balanced proportion between upper and lower lips, and a well-defined vermilion border with natural fullness and volume.[2,3]

Aging causes changes in the lips, resulting in increased lip length, decreased volume, flattened philtrum, and decreased nasolabial tissue thickness.[4] Factors such as sun exposure, stress hormones, nicotine, and alcohol use influence these changes.[4] Lip color is influenced by redness and melanin content.[5] Redness of lips decreases significantly with age due to decreased blood vessel number and total area, and melanin content increases with age as identified by increased melanin index.[5-8] Histopathological changes include decreased epithelium thickness, collagen and elastic fibers fragmentation, flattening of rete ridges, increased subcutaneous tissue, and atrophy of Orbicularis oris muscle, causing perioral wrinkles.[3,9]

Lip rejuvenation treatment includes injections, topical therapy, surgical lip lifts, and laser treatment. Hyaluronic acid injections, though efficient, may have adverse effects such as tenderness, bruising, injection site swelling, foreign body granuloma, angioedema, and do not target lip color.[9] Topical treatments, such as retinoids, chemical peels, have a lower cost but minimal results.[2,10] Invasive lip lift significantly improves lip appearance; however, it leaves scars.[11] Among all, laser treatments are popular for their safety and minimal downtime.[3,11]

Liplase® is a non-surgical, non-invasive treatment for patients who desire lip augmentation and lip lightening. It involves the use of the thermal mode of non-ablative Er:YAG (Smooth mode) and super long pulse Nd:YAG (Piano mode) laser, causing collagen regeneration resulting in a fuller, more natural appearance of the lips.[2] The results typically last 4–6 months and are suitable for all skin types.[12]

Despite its potential, only limited studies and single-case reports exist on Liplase,[2,12] with no published case studies involving the skin of the color population to date.

Hence, this study aims to assess the safety and efficacy of Liplase® in the Indian population for lip rejuvenation, focusing on improvement in lip color, volume, and texture. In addition, outcomes include patient satisfaction and pain visual assessment score, and physician assessment score for observed improvement.

MATERIAL AND METHODS

This prospective interventional study was conducted at Cutis Hospital, Bengaluru, over 6 months from December 2023 to May 2024. Approval was obtained from the institutional ethics committee. Written inform consent was obtained from all patients. Eligible candidates include males and females aged 18–54 seeking a non-invasive treatment for lip fullness and color enhancement. Exclusion criteria included a history of lip tattoo, use of photosensitive or immunosuppressive medicines, lichen planus, active herpes labialis or zoster, skin malignancy, or previous lip injections.

Protocol

The laser treatment protocol with Fotona's SP Dynamis Pro utilized 2940 nm Erbium: YAG laser with 4–6 passes of intraoral smooth-mode (spot size: 7 mm, energy: 9 J/cm^2, 1.6 Hz) followed by 4 extraoral passes, then a 1064 nm Nd:YAG extraoral piano mode for skin tightening (spot size: 15 mm, energy: 90 J/cm^2, 0.35 Hz) achieving 42°C. This was followed by 3 min local cooling with Zimmer. The Nd:Yag heating and cooling were repeated for a total of 2 cycles. Each participant received treatment monthly for 3 months. Patients were monitored with baseline photo documentation, before each session, and 3 months after the final session (follow-up).

Esthetic improvement was assessed monthly and 3 months post-treatment using quantificare 3D imaging. Color and erythema were evaluated through a color chart and colorimeter. The colorimeter was placed at the middle of the lower lip and on the right side of the median tubercle at the middle of the upper lip. Improvement ratings were provided by both physicians and patients, assessing lip volume, color, texture, and overall improvement using the following Likert scale: 1 – no improvement; 2 – slight improvement; 3 – some improvement; 4 – improved; and 5 – very much improved. Pain scores were recorded from all patients in the 3rd month, and were rated as follows: 0 – no pain, 1–3 – mild-to-moderate pain; 4–6 – moderate-to-severe pain; 7–9 – severe-to-very severe pain; and 10 – worst pain possible. For post-treatment care, patients were advised to use moisturizing lip balm with sun protection factor (SPF).[2-4,12] To minimize pain, a topical anesthetic cream was applied for 30 min to only 3 patients during the 2nd and 3rd session; the rest were able to undergo the procedure with minimal discomfort. Male patients were advised to shave 1 day before the procedure.

RESULTS

A total of 15 patients (8 females, 7 males) aged 29–48 years (mean age 32.7 ± 1.3 years) participated in this study. All patients had Fitzpatrick skin types IV–V, with average daily sun exposure of 22.69 min (range: 5–60 min/day). Thirteen patients completed the study; two discontinued after 1st session due to skin dryness and peeling.

Lip volume showed noticeable improvement, as indicated by naso-labial angles in 8 out of 13 patients (mean-baseline value – 123.83 and follow-up –124.06) and labio-mental angles in 10 out of 13 patients (mean-baseline value – 139.64, follow-up – 136.47), while lip wrinkles and evenness improved across all the patients, as depicted in quantificare images clinically [Figures 1-7].

Colorimeter showed reduction in melanin and improvement in erythema in all patients throughout the sessions and 3 months after the final treatment, as depicted by baseline upper and lower lip melanin and erythema index (upper lip-baseline mean–melanin index – 520.15, mean erythema index – 420.46 lower lip-baseline mean–melanin index – 445.76, mean erythema index – 460.03) and after 3 months of follow-up (upper lip-baseline mean–melanin index – 496.76, mean erythema index-460.53 lower lip-baseline mean–melanin index – 404.76, mean erythema index – 493.53) [Tables 1 and 2]. Color chart assessment by visual inspection showed consistent improvement in pigment score in all patients. Two patients, who inconsistently used SPF lip balm, maintained erythema index; however showed an increase in

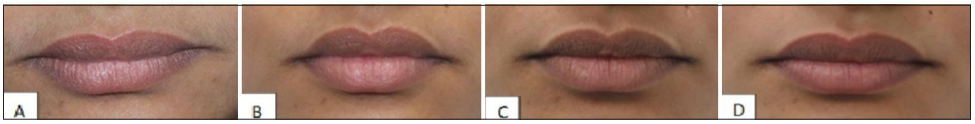

Figure 1: Clinical images of lips at (A) baseline, (B) session 1, (C) session 2, (D) follow up.

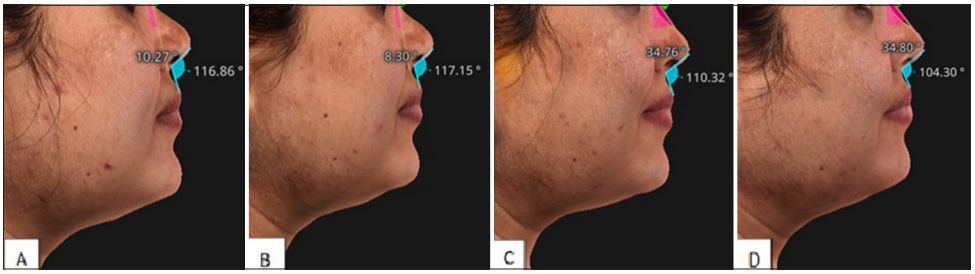

Figure 2: Quantificare 3D images of Naso-labial angles (A) baseline-116.86, (B) session 1-117.15, (C) session 2-110.32, (D) followup-104.3.

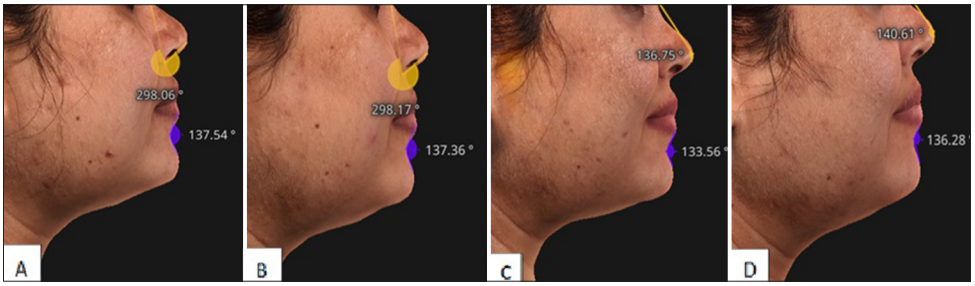

Figure 3: Quantificare 3D images of mentolabial angles- (A) baseline-137.54, (B) session 1-137.36, (C) session 2-133.56, (D) followup-136.28.

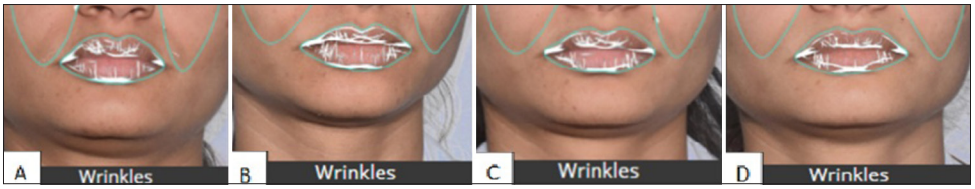

Figure 4: Quantificare 3D images of Wrinkles – (A) baseline, (B) session 1, (C) session 2, (D) follow up.

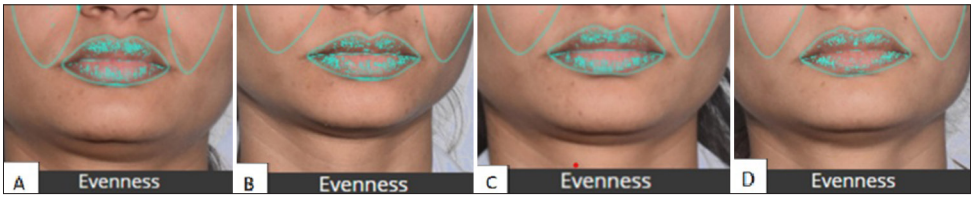

Figure 5: Quantificare 3D images of Lip evenness – (A) baseline, (B) session 1, (C) session 2, (D) follow up.

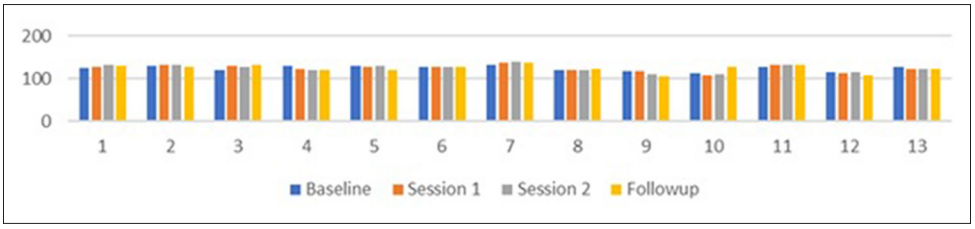

Figure 6: Naso-labial angle (where X axis shows 13 male and female candidates, Y axis shows degree of Naso-labial angle).

Table 1: Melanin index.

Upper lip				Lower lip			
Baseline	**Session 1**	**Session 2**	**Session 3**	**Baseline**	**Session 1**	**Session 2**	**Session 3**
698	416	388	439	623	386	247	271
525	525	494	510	400	392	404	469
761	514	502	553	647	451	361	467
678	612	620	612	576	565	560	553
424	482	400	420	396	349	310	349
533	608	606	623	439	412	424	525
346	345	322	388	263	251	247	341
522	572	584	537	451	381	475	392
443	412	510	416	357	353	337	322
643	576	616	670	545	522	467	530
498	498	471	525	404	369	533	463
424	451	408	435	337	267	330	330
267	353	326	330	357	251	216	250

Table 2: Erythema index.

Upper lip				Lower lip			
Baseline	**Session 1**	**Session 2**	**Session 3**	**Baseline**	**Session 1**	**Session 2**	**Session 3**
474	433	430	465	483	433	426	474
479	466	472	416	489	476	486	501
461	408	469	462	483	434	520	573
359	443	443	443	386	441	462	462
417	467	480	476	422	504	502	534
412	452	462	452	436	491	492	491
417	417	459	451	433	453	470	471
402	449	454	460	406	485	473	477
423	425	491	497	407	430	489	500
372	382	445	450	402	403	486	480
404	411	485	463	430	440	466	471
425	434	493	492	446	433	522	522
421	466	455	460	414	439	461	460

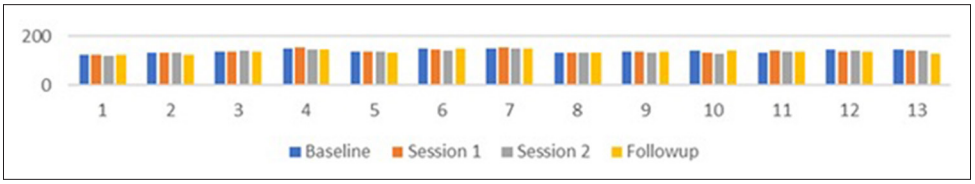

Figure 7: Mento-labial angle (where X axis shows 13 male and female candidates, Y axis shows degree of Mento-labial angle).

melanin content, which resolved after topical depigmenting agents.

Patients satisfaction scores revealed that 53% noted improvement in lip volume (Likert score = 2), 100% saw improvement in lip color (Likert = 2 and above), 76.9% reported improvement in lip texture (Likert = 2 and above), and 100% observed overall improvement in lip appearance (Likert = 2 and above; [Table 3]).

Table 3: Patient satisfaction scores.

Volume	Color	Texture	Overall	VAS
2	2	2	2	2
1	3	1	2	1
2	3	2	2	2
2	2	2	2	2
2	2	2	2	3
1	2	2	2	5
1	4	3	3	3
1	2	1	2	0
1	3	1	2	2
2	2	2	2	8
1	3	3	3	3
2	2	3	3	5
2	2	2	2	2

VAS: Visual analogue scale

Table 4: Physician satisfaction scores.

Volume	Color	Texture	Overall
Physician satisfaction score			
2	2	2	2
1	3	1	2
2	3	2	2
2	2	2	1
2	2	2	2
1	2	2	2
1	4	3	3
1	2	1	2
1	3	1	2
2	2	2	2
1	3	3	3
2	2	3	2
2	2	2	2

Physician satisfaction scores revealed that 53% noted improvement in lip volume (Likert score = 2), 100% saw improvement in lip color (Likert = 2 and above), 76.9% reported improvement in lip texture (Likert = 2 and above), and 92.3% observed overall improvement in lip appearance (Likert = 2 and above; [Table 4]) ($P < 0.001$).

Pain levels (visual analogue scale) varied, with 38% patients reporting level 2 while 23% reported level 3, 15% level 5, and 8% reported level 0, 1, and 8 each [Table 3].

Eight patients observed lip and peri-oral peeling for 3–4 days posttreatment, managed with moisturizer, and two patients with severe dryness and peeling were prescribed fluocinolone acetonide 0.01% cream twice daily for 3 days.

DISCUSSION

Lip augmentation procedures are gaining popularity, as noted by the American Society of Plastic Surgeons in 2023.[13] Aging typically leads to thinning and lengthening of the lips due to decreased forward curvature and thickness of orbicularis oris. It is often accompanied by a drooping angle with increasing lip width due to changes such as atrophy of the levator labii superioris, bone resorption of the alveolar ridge, increased perioral soft-tissue envelope redundancy, and intrinsic soft tissue. Overall, it produces an inverted U-shaped appearance.[6-8]

Our study included 15 participants (8 females, 7 males) aged 29–48 years, marking the first effort to assess the male patients. While most prior studies focused on patients over 40 years old[2,12] or comprised case reports,[12,13] we included a younger age group of both male and female patients.

Clinical images and Quantificare 3D imaging depicted noticeable improvement in lip volume, wrinkles, and evenness. Our findings on lip esthetic improvement align with other studies[2-4,12] that relied on clinical images[2,3,12] or pixel tip measurements.[3] This study uniquely assessed wrinkle and evenness, showing greater benefits with mild-moderate lip volume enhancement. We recommend performing the procedure every 2–3 weeks for optimal results.

Lip color assessment showed a significant reduction in lip melanin and consistent with findings in previous studies.[3,4] In addition, we noted a significant improvement in lip erythema, a marker of increased vascularity. This parameter has not been previously reported in the literature. Lip color assessments in earlier studies relied on subjective clinical evaluation, whereas we employed an objective tool like a colorimeter for better accuracy.[2] Two patients experienced temporary darkening of the lip after the procedure due to inadequate SPF use, which resolved after topical depigmenting agents for 4 weeks.

Patient satisfaction scores for lip color, volume, and texture were 100%, 53%, and 76.9%, respectively, with noticeable color improvement in all patients. Compared to a prior study by Ifrah *et al.*,[4] satisfaction scores were higher (94% for color, 72% for volume, and 91% for texture). In our study, pain scores ranged from 2 to 5 in 76% of patients, which were higher than those reported in a previous study, where 84% of patients reported zero pain score.[3] Thus, topical anesthetic cream was applied for 30–40 min pre-procedure.

Lips and peri-oral peeling lasting 3–4 days occurred in 8 patients, a more prominent observation compared to other studies.[2,3,12] Hence, patients should be informed about

potential downtime. Follow-up assessment at 3 months showed sustained improvement in lip volume, color, and texture, a parameter not evaluated in previous studies.[2,3,12] Two patients reported immediate plumpness post-procedure, which lasted for a few hours.

Our study has a few limitations, including a small sample size, short follow-up duration, and the lack of a control group. Future studies should address these limitations by conducting randomized controlled trials with larger and more diverse patient populations. In addition, there is a need to develop standardized tools for assessing lip esthetics, particularly in skin of color. Existing studies predominantly focus on female participants and lack long-term outcomes.

CONCLUSION

This study establishes a foundation for incorporating Liplase® as a safe, non-ablative tool for lip rejuvenation, to enhance lip color, texture, volume, and wrinkles. Lip augmentation through Liplase® treatment remains an underexplored area, particularly in the Indian population and among male patients.

This study uniquely incorporated objective tools such as 3D imaging and colorimeters to measure improvements. It also assessed patient and physician satisfaction scores and pain levels, aspects often overlooked in earlier research. Our findings emphasize the need for further studies with larger, diverse populations and standardized protocols to validate these observations and refine treatment protocols.

Authors contribution: Dr. Chaithra Shenoy - Concepts, design, definition of intellectual content, literature search, clinical studies, experimental studies, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing and review, Dr. Dhanya Nayak- Concepts, design, definition of intellectual content, literature search, clinical studies, experimental studies, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing and review, Dr. Byalakere Shivanna Chandrashekar- Concepts, design, definition of intellectual content, literature search, clinical studies, data acquisition, data analysis, manuscript editing and review, Dr. Atul Rajeendran- Literature search, clinical studies, experimental studies, data analysis, statistical analysis, manuscript.

Ethical approval: The research/study was approved by the Institutional Review Board at Cutis Institutional Ethics Committee, number ECR/930/Inst/KA/2017/RR-25, dated December 20, 2023.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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