

**ORIGINAL RESEARCH**

# Comparison of efficacy of 40% lactic acid peel versus 40% mandelic acid peel in periorbitalmelanosis: A split-face study

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## ABSTRACT

Periorbitalmelanosis (POM) presents with dark area surrounding the eyelids. POM is an ill-defined multifactorial, relatively common cosmetic condition. Despite great number of available treatment modalities to treat POM, there is paucity of scientific studies to support their use. POM patients attending the Department of Dermatology, who met inclusion and exclusion criteria were included in the study. Chemical peeling was performed with 40% mandelic acid on right side and 40% lactic acid on left side every fortnightly. A total of 30 patients were recruited in the study. At the end of 12 weeks, 10% showed excellent, 23.3% had good, 63.3% had fair & 3.3% had poor improvement with 40% mandelic acid peel and 10% showed excellent, 23.3% had good, 60% had fair & 6.7% had poor improvement with 40% lactic acid peel. Both peels were equally effective in terms of improvement in grade.

**Key words:** Periorbitalmelanosis, 40% lactic acid peel, 40% mandelic acid peel

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## INTRODUCTION

Eyes, these expressive twins can convey great emotion. They can light up a face or make a perfectly lit up face appear tired and drab. Dark circles can make one look surprisingly older than they actually are!

Periorbitalmelanosis (POM) is also known as periorbital hyperpigmentation, infraorbital pigmentation, dark circles.<sup>1</sup> POM presents with dark area surrounding the eyelids.<sup>2</sup> It is more common in females.<sup>3</sup>

POM is an ill-defined condition & the cause for POM is multifactorial.<sup>4</sup> It is also thought to have a genetic basis.<sup>1</sup> It can also occur due to periorbital edema, excessive pigmentation,

postinflammatory hyperpigmentation secondary to allergic contact dermatitis & atopic dermatitis, superficial location of vasculature, shadowing due to skin laxity & tear trough defect which is associated with aging.<sup>2</sup>

POM can be treated with topical agents like hydroquinone (HQ), kojic acid, retinoic acid, azelaic acid, chemical peels, surgery & laser therapy.<sup>3</sup>

Chemical peeling procedure results in removal of melanin from stratum corneum & epidermis. In addition, deep peels modulate the melanin content in the dermis.<sup>5</sup> Most commonly used chemical peels are alphahydroxy acids (AHA). Among them, glycolic acid is the most widely used.<sup>6</sup> Lactic acid is a mild alphahydroxy acid which is obtained from sour milk, yogurt & tomato juice. Mandelic acid is a natural alphahydroxy acid which occurs in bitter almonds, peaches & apricots.<sup>7</sup>

Though mandelic acid is a depigmenting agent, there is no study conducted on the use of mandelic acid in POM. Penetration of mandelic acid is very less owing to the large molecular size like lactic acid, hence it can be safely used in POM.<sup>8</sup>

Despite great number of available topical medications to treat POM, there is paucity of scientific studies to support their use.<sup>4</sup> Hence this study was undertaken to compare the efficacy & side effects of lactic acid peel & mandelic acid peel in the treatment of POM.

## METHODOLOGY

This comparative study was conducted after obtaining

the ethical clearance. All patients attending the dermatology OPD were observed and screened for periorbitalmelanosis. A total of 30 patients who fulfilled inclusion and exclusion criteria & consented for the study were enrolled in the study.

### INCLUSION CRITERIA

1. Patients presenting with periorbitalmelanosis.
2. Age > 18 years.

### EXCLUSION CRITERIA

1. Patients who have not given consent.
2. Patients on topical depigmenting agents in the previous 2 weeks.
3. Pregnancy & lactation.
4. Patients with chronic debilitating disease.
5. Patients with generalized pigmentation of the face
6. Patients with active bacterial, viral, fungal infection.
7. Patients with keloidal tendency.
8. Patients with known allergy to peeling agents (lactic acid, mandelic acid).
9. Patients who develop allergy or untoward reactions on test peel.
10. Patients with vascular type and structural type of periorbitalmelanosis.

### METHOD OF COLLECTION OF DATA

All the patients attending the dermatology OPD were screened for periorbitalmelanosis. Detailed history was taken and clinical examination was performed in the patients with periorbitalmelanosis. Dermatological examination of the periorbital area was also done to determine the type of periorbitalmelanosis (vascular and structural type were excluded by a stretch test). 30

patients who fulfilled the inclusion and exclusion criteria were enrolled for the study after explaining the study requirement in the language they understand and written informed consent was taken. Test peel was done in the retroauricular area skin before starting the treatment.

After a test peel, patients were treated with 40% lactic acid peel on left side and with 40% mandelic acid peel on right side once in 2 weeks for 3 months. Clinical improvement was assessed by serial photographic evaluation using digital camera every fortnight, by visual analogue scale. Assessment was done by 2 dermatologists and the average of their score was taken. The improvement was graded as

- 0-25% - poor.
- 26-50% - fair.
- 51-75% - good.
- 76-100% - excellent.

Clinical improvement was also assessed by POM grading done at baseline, at 2 weeks & 2 months after the completion of treatment.

Ranuet *et al.*, grading of periorbitalmelanosis:

0- Skin colour comparable to other facial skin areas.

1 - Faint pigmentation of infra orbital fold.

2 - Pigmentation more pronounced.

3 - Deep dark colour, all four lids involved.

4 - Grade 3 + pigmentation spreading beyond infraorbital fold.

Patients were also observed for side effects of lactic acid & mandelic acid peels like erythema, burning sensation, pruritus, dryness, frosting, hyperpigmentation, etc.

### RESULTS

**Table 1: Improvement with 40% mandelic acid peel**

Improvement on right side treated with 40% mandelic acid peel	Poor 0 to 25%		Fair 26 to 50%		Good 51 to 75%		Excellent 76 to 100%	
	No.	%	No.	%	No.	%	No.	%
2 weeks	27	90.0%	3	10.0%	0	0.0%	0	0.0%
4 weeks	20	66.7%	7	23.3%	3	10.0%	0	0.0%
6 weeks	7	23.3%	20	66.7%	3	10.0%	0	0.0%
8 weeks	1	3.3%	22	73.3%	7	23.3%	0	0.0%
10 weeks	1	3.3%	20	66.7%	8	26.7%	1	3.3%
12 weeks	1	3.3%	19	63.3%	7	23.3%	3	10.0%

In the study, on the right side treated with 40% mandelic acid peel it was found that at 2 weeks, 90% had poor improvement and 10% had fair improvement. At 4 weeks, 66.7% had poor, 23.3% had fair and 10% had good improvement. At 6 weeks, 23.3% had poor, 66.7% had fair and 10% had good

improvement. At 8 weeks, 3.3% had poor, 73.3% had fair and 23.3% had good improvement. At 10 weeks, 3.3% had poor, 66.7% had fair, 26.7% had good improvement and 3.3% had excellent improvement & at 12 weeks, 3.3% had poor, 63.3% had fair, 23.3% had good and 10% had excellent improvement.

**Table 2: Improvement with 40% Lactic Acid Peel**

Improvement on left side treated with 40% lactic acid peel	Poor 0 to 25%		Fair 26 to 50%		Good 51 to 75%		Excellent 76 to 100%	
	No.	%	No.	%	No.	%	No.	%
2 weeks	27	90.0%	3	10.0%	0	0.0%	0	0.0%

4 weeks	20	66.7%	7	23.3%	3	10.0%	0	0.0%
6 weeks	7	23.3%	20	66.7%	3	10.0%	0	0.0%
8 weeks	2	6.7%	21	70.0%	6	20.0%	1	3.3%
10 weeks	2	6.7%	19	63.3%	7	23.3%	2	6.7%
12 weeks	2	6.7%	18	60.0%	7	23.3%	3	10.0%

In the study, on the left side treated with 40% lactic acid peel it was found that at 2 weeks, 90% had poor improvement and 10% had fair improvement. At 4 weeks, 66.7% had poor, 23.3% had fair and 10% had good improvement. At 6 weeks, 23.3% had poor, 66.7% had fair and 10% had good improvement. At 8 weeks, 6.7% had poor, 70% had fair, 20% had good

improvement and 3.3% had excellent improvement. At 10 weeks, 6.7% had poor, 63.3% had fair, 23.3% had good improvement and 6.7% had excellent improvement. At 12 weeks, 6.7% had poor, 60% had fair, 23.3% had good improvement and 10% had excellent improvement.

**Table 3: Improvement comparison between the two sides treated with 40% mandelic acid peel and 40% lactic acid peel at different periods of followup**

Duration and Percentage of Improvement		Side				P value
		Right side treated with 40% mandelic acid peel		Left side treated with 40% lactic acid peel		
		No.	%	No.	%	
2 weeks	Poor 0 to 25%	27	90.0%	27	90.0%	1.000
	Fair 26 to 50%	3	10.0%	3	10.0%	
	Good 51 to 75%	0	0.0%	0	0.0%	
	Excellent 76 to 100%	0	0.0%	0	0.0%	
4 weeks	Poor 0 to 25%	20	66.7%	20	66.7%	1.000
	Fair 26 to 50%	7	23.3%	7	23.3%	
	Good 51 to 75%	3	10.0%	3	10.0%	
	Excellent 76 to 100%	0	0.0%	0	0.0%	
6 weeks	Poor 0 to 25%	7	23.3%	7	23.3%	1.000
	Fair 26 to 50%	20	66.7%	20	66.7%	
	Good 51 to 75%	3	10.0%	3	10.0%	
	Excellent 76 to 100%	0	0.0%	0	0.0%	
8 weeks	Poor 0 to 25%	1	3.3%	2	6.7%	0.698
	Fair 26 to 50%	22	73.3%	21	70.0%	
	Good 51 to 75%	7	23.3%	6	20.0%	
	Excellent 76 to 100%	0	0.0%	1	3.3%	
10 weeks	Poor 0 to 25%	1	3.3%	2	6.7%	0.859
	Fair 26 to 50%	20	66.7%	19	63.3%	
	Good 51 to 75%	8	26.7%	7	23.3%	
	Excellent 76 to 100%	1	3.3%	2	6.7%	
12 weeks	Poor 0 to 25%	1	3.3%	2	6.7%	0.948
	Fair 26 to 50%	19	63.3%	18	60.0%	
	Good 51 to 75%	7	23.3%	7	23.3%	
	Excellent 76 to 100%	3	10.0%	3	10.0%	

In the study, there was no significant difference in improvement between the two sides treated with 40%

mandelic acid peel and 40% lactic acid peel from 2 weeks to 12 weeks of follow up.

**Table 4: Grade comparison between two sides at different periods of followup**

Grade Comparison	Side				P value
	Right side treated with 40% mandelic acid peel		Left side treated with 40% lactic acid peel		
	Mean	Median	Mean	Median	
Baseline	3	3	3	3	1.000
2 weeks after treatment completion	2	1	2	1	1.000
2 months after treatment completion	2	1	2	1	1.000

In the study, there was no significant difference in grade between right and left side from baseline to 2 months after treatment completion.

## DISCUSSION

In the study, on the right side treated with 40% mandelic acid peel it was found that at 2 weeks, 90% had poor improvement and 10% had fair improvement. At 4 weeks, 66.7% had poor, 23.3% had fair and 10% had good improvement. At 6 weeks, 23.3% had poor, 66.7% had fair and 10% had good improvement. At 8 weeks, 3.3% had poor, 73.3% had fair and 23.3% had good improvement. At 10 weeks, 3.3% had poor, 66.7% had fair, 26.7% had good improvement and 3.3% had excellent improvement. At 12 weeks, 3.3% had poor, 63.3% had fair, 23.3% had good improvement and 10% had excellent improvement. As this study is the first of its kind where 40% mandelic acid peel was used in the treatment of POM, there are no earlier studies to compare the results.

In the study, on the left side treated with 40% lactic acid peel it was found that at 2 weeks, 90% had poor improvement and 10% had fair improvement. At 4 weeks, 66.7% had poor, 23.3% had fair and 10% had good improvement. At 6 weeks, 23.3% had poor, 66.7% had fair and 10% had good improvement. At 8 weeks, 6.7% had poor, 70% had fair, 20% had good improvement and 3.3% had excellent improvement. At 10 weeks, 6.7% had poor, 63.3% had fair, 23.3% had good improvement and 6.7% had excellent improvement. At 12 weeks, 6.7% had poor, 60% had fair, 23.3% had good improvement and 10% had excellent improvement. There are no earlier studies where 40% lactic acid peel was used to treat POM, hence the results couldn't be compared.

In this study, we found that there was no statistically significant difference in the improvement between the two sides treated with 40% mandelic acid peel and 40% lactic acid peel from 2 weeks to 12 weeks of follow up.

In the study, on right side at baseline, Grade was 2 in 30%, Grade 3 in 66.7% and Grade 4 in 3.3%. At 2 weeks after treatment with 40% mandelic acid peel, 3.3% had Grade 0, 50% had Grade 1, 36.7% had Grade 2, 10% had Grade 3 and at 2 months after the treatment, 3.3% had Grade 0, 50% had Grade 1, 36.7% had Grade 2, 10% had Grade 3, The improvement in the grade was statistically significant ( $p < 0.05$ ). There was no change in the grade of POM at 2 months of followup after treatment when compared to the grade at 2 weeks after treatment completion.

In the study, on left side at baseline, Grade was 2 in 30%, Grade 3 in 66.7% and Grade 4 in 3.3%. At 2 weeks after treatment with 40% lactic acid peel, 3.3% had Grade 0, 50% had Grade 1, 36.7% had Grade 2, 10% had Grade 3 and at 2 months after the treatment, 3.3% had Grade 0, 50% had Grade 1, 36.7% had Grade 2, 10% had Grade 3. The improvement in the

grade was statistically significant ( $p < 0.05$ ). There was no change in the grade of POM at 2 months of followup after treatment when compared to the grade at 2 weeks after treatment completion.

In this study, we found that there was no statistically significant difference in the improvement in the grade of POM between the two sides treated with 40% mandelic acid peel and 40% lactic acid peel. Thus both the peels are equally effective in the treatment of POM.

## CONCLUSION

Periorbital melanosis is a relatively common condition with major cosmetic concern especially in females. It produces a significant impact on the quality of life as it imparts a tired looking and lethargic appearance to the face.

It is less responsive to standard therapies due to its multifactorial etiology and deposition of melanin in both dermis and epidermis. However, even a mild to moderate improvement in appearance can cause a significant improvement in the quality of life of the patient, hence simple physical modalities such as chemical peels can be used to treat the patients who want to improve the cosmetic appearance of their face.

In this study, we found that both 40% mandelic acid peel and 40% lactic acid peel were equally effective in the treatment of periorbital melanosis. In terms of side effects, 40% mandelic acid peel was associated with significantly lesser side effects than 40% lactic acid peel.

## REFERENCES

1. Sarkar R. Idiopathic cutaneous hyperchromia at the orbital region or periorbital hyperpigmentation. *J Cutan Aesthet Surg*. 2012;5:183-184.
2. Freitag FM, Cestari TF. What causes dark circles under the eyes? *J Cosmet Dermatol*. 2007;6(3):211-215.
3. Ranu H, Thng S, Goh BK, *et al.*, Periorbital hyperpigmentation in Asians: an epidemiologic study and a proposed classification. *Dermatol Surg*. 2011;37(9):1297-1303.
4. Ranjan R, Sarkar R, Garg VK, Gupta T. A comparative study of two modalities, 4% Hydroquinone versus 30% Salicylic acid in periorbital hyperpigmentation and assessment of quality of life before and after treatment. *Indian J Dermatol*. 2016;61(4):413-417.
5. Vrcek I, Ozgur O, Nakra T. Infraorbital dark circles: A review of the pathogenesis, evaluation and treatment. *J Cutan Aesthet Surg*. 2016;9:65-72.
6. Roh MR, Chung KY. Infraorbital dark circles: definition, causes, and treatment options. *Dermatol Surg*. 2009;35:1163-1171.
7. Sharad J. Newer Superficial peels. In: Venkataram M, editor. *ACS(I) Textbook on Cutaneous & Aesthetic Surgery*, 1st ed. New Delhi: Jaypee Brothers Medical Publishers; 2012. p.593-594.
8. Sarkar R, Ranjan R, Garg S, Garg VK, Sonthalia S, Bansal S. Periorbital Hyperpigmentation: A Comprehensive Review. *J Clin Aesthet Dermatol*. 2016;9(1):49-55.