

Comparative efficacy of topical 4% hydroquinone vs. 4% hydroquinone plus 10% mandelic acid in the treatment of melasma

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Abstract *Objective* To compare the efficacy of topical 4% hydroquinone with combination of 4% hydroquinone and 10% mandelic acid serum in the treatment of melasma.

Methods This comparative study was conducted from 1st June, 2017 to 31st December, 2017 at dermatology outpatient (OPD). The trial included 100 patients age ranging from 16 to 50 years, having facial melasma. Patients were randomized to receive topical 4% hydroquinone (group I) or 4% hydroquinone along with 10% mandelic acid (group II). Efficacy was determined at week 24.

Results Both groups showed improvement in melasma; however, group II showed better results. At final follow-up, 50% patients in group II showed a response of >50%; however, in group I, only 20% patients showed >50% response.

Conclusion The combination of 4% hydroquinone with 10% mandelic acid is more effective in melasma as compared to conventional topical treatment.

Key words

Melasma, hydroquinone, 10% mandelic acid serum, sunscreen.

Introduction

Melasma, which may be symmetric or asymmetric, is an acquired pigmentary disorder characterized by hyperpigmented macules and patches affecting sun-exposed skin. There are three major pattern of distribution: centropal (forehead, nose, cheeks and upper lips), malar (nose and cheeks) and mandibular (ramus). Melasma can be classified into epidermal, dermal and mixed types. The precise etiology of melasma is unknown, but ultraviolet radiation, pregnancy, oral antiepileptic drugs and thyroid dysfunction are considered as risk factors of

melasma. Melasma imposes major emotional and psychological burden on the patients and greatly affect their quality of life. Common therapeutic approaches for melasma include topical hydroquinone (HQ), azelaic acid, steroid creams, chemical peels and lasers. These modalities induce considerable outcomes.¹⁻⁵

Hydroquinone (HQ) inhibits the tyrosinase enzyme activity. Despite the adverse effects and moderate response, HQ is considered as the gold standard treatment in melasma. Mandelic acid is one of the largest alpha hydroxy acids, which is used in treatment of melasma. It enables removal of epidermal melanin as well as melanin from the keratinocytes. It also halts melanosome transfer to keratinocytes. Use of sunblock is our absolute mandatory step in the treatment of melasma. A broad spectrum sun

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screen with physical blocking agents and sun protection factor (SPF) 30 is necessary and should be started at first consultation.⁶

The present study was undertaken to compare the efficacy of 4% HQ with combination of 4% HQ and 10% mandelic acid in the treatment of melasma.

Methods

It was a randomized control clinical trial approved by the ethical committee of our hospital. After informed consent, we enrolled 100 patients of melasma fulfilling the inclusion criteria, which included females suffering from any type of melasma (epidermal, dermal or mixed) with age range between 16 to 50 years. The exclusion criteria included pregnancy, lactation, patients with history of photosensitive dermatoses or hypersensitivity to the components of the formulas of the study. Patients suffering from hypertension, diabetes, skin infection or any systemic illness, patients with history of intake of drugs like hormones, isotretinoin, steroids during last three months were also excluded from the study.

A detailed history was taken from each patient regarding age, occupation, time of onset, history of pregnancy, lactation, drug intake and sun exposure. Type of melasma was identified with the help of Wood's lamp.

Treatments groups were allocated into groups by lottery method. All patients were instructed to apply the sunscreen with a SPF ≥ 30 and to avoid heat and sunlight. In both group I and II, 4% HQ cream was applied at night over the affected areas. Group II patients also applied 10% mandelic acid weekly. The treatment was given for 20 weeks. Follow-up was carried out fortnightly. Final follow-up was carried out 4-weeks after stopping the treatment. Melasma

area and severity index (MASI) was calculated at the baseline and then at follow-up visit.⁷ Improvement was graded as reduction of MASI at 24 weeks as excellent when $>80\%$ improvement, good 51-80% improvement, satisfactory 26-50% improvement and poor when 1-25% improvement.

Results

A total of 100 patients were enrolled for this study. They were randomized into group I (topical 4% HQ) and group II (topical 4% HQ and 10% mandelic acid). All our patients were females with age range of 16 to 50 years.

Regarding the grades of improvement (**Table 1** and **2**), higher number of patients in group II than in group I i.e. (20% vs. 5 (10%)) showed $>80\%$ improvement graded as excellent, 51-80% improvement was graded as good which was seen in 15 (30%) patients in group II, however, only 5 (10%) patients of group I showed good response. In group I, 30 (60%) patients showed poor response i.e. (1-20%), however, patients of group II showed only 13 (26%) patients in this category.

The side effects after mandelic acid peel during study were erythema, dryness, scaling and burning sensations. There were transient.

Discussion

Melasma is one of the common, acquired, pigmentary conditions in Asian and is found to be an exceptionally taxing condition to treat. The pathogenesis involves an increase in the number of melanocytes and increased activity of melanogenic enzymes overlying one dermal changes.

Results of our study are also in conformity with most of the previous studies, which showed

Table 1 Grades of efficacy in two treatment groups. Group I: 50 patients applied 4% hydroquinone along with sunscreen. Group II: 50 patients applied topical 4% hydroquinone, sun block and 10% mandelic acid serum.

Grade of efficacy	Type of melasma	Group I (N) 4% Hydroquinone	Group II (N) 4% Hydroquinone + 10% mandelic acid
Excellent (>80% improvement)	Dermal	2	3
	Epidermal	2	4
	Mixed	1	3
	Total	5	10
Good (51-80% improvement)	Dermal	2	4
	Epidermal	2	6
	Mixed	1	5
	Total	5	15
Satisfactory (26-50% improvement)	Dermal	4	5
	Epidermal	5	4
	Mixed	1	3
	Total	10	12
Poor (1-25% improvement)	Dermal	10	6
	Epidermal	2	4
	Mixed	8	3
	Total	30	13

Table 2 Summary of efficacy in two treatment groups. Group I: topical 4% hydroquinone and group II: topical 4% hydroquinone and 10% mandelic acid serum.

Response	Group I, N (%)	Group II, N (%)
Excellent (>80% improvement)	5 (10%)	10 (20%)
Good (51-80% improvement)	5 (10%)	15 (30%)
Satisfactory (26-50% improvement)	10 (20%)	12 (24%)
Poor (1-25% improvement)	30 (60%)	13 (26%)

female predominance suffering from melasma.²⁻⁵ HQ works by inhibiting the tyrosinase and thus prevents the conversion of DOPA to melanin and is also related to tyrosinase destruction and melanosome degradation. Our results showed that multiple topical treatments when combined together show better results as compared with monotherapy of HQ. Many studies showed results consistent with our research.⁸

In terms of grades of improvement, 50% patients of group II showed >50% improvement, however, only 20% patients showed >50% improvement of melasma in group I. An Indian study also showed that 10% mandelic acid when used in combination therapy, improved MASI score.⁹ Treatment of melasma is aimed at the removal of pigment by number of ways e.g. topically by the combination treatments as in our study. Epidermal melasma responds better to

treatment than dermal or mixed type. First-line of therapy is use of sunscreen¹⁰ and pigment destruction by slowing down the proliferation of melanocytes and also inhibition of melanosome formation and its destruction. Fruits acids like mandelic acid increases the epidermal remodeling and increases the turnover of keratinocytes with resultant reduction of pigment.^{11,12}

In our study side effects with use of 10% mandelic peel were erythema, dryness, scaling and burning sensation which were also seen in other studies.

Conclusion

Combination of 4% hydroquinone with 10% mandelic acid is more efficacious than 4% hydroquinone.

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