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Evaluation of the Efficacy of Hydroquinone in the Treatment of Melasma

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Abstract

Background: Melasma is a common acquired hyperpigmentation disorder predominantly affecting facial areas. While various treatment options exist, the efficacy of hydroquinone in treating Melasma, particularly in diverse populations, requires further investigation.

Objectives: To evaluate the efficacy of hydroquinone in the treatment of facial melisma through assessment of Melisma Area and Severity Index (MASI) scores.

Methods: An open clinical trial was conducted over two years (July 2022-June 2024) at the Department of outdoor patients of National Institute of Diseases of the Chest and Hospital, Bangladesh. The study included 145 patients aged 20-50 years who met specific inclusion criteria. Treatment efficacy was evaluated using MASI scores at 4, 8, and 12-week intervals.

Results: The study population comprised predominantly females with a malar distribution pattern being most common. The largest age group affected was 36-40 years. Most participants were housewives or service holders with varied educational backgrounds. After 12 weeks of treatment, the majority of patients showed improvement in MASI scores, though response rates varied significantly among participants.

Conclusion: Hydroquinone demonstrated mild to moderate efficacy in Melasma treatment with minimal side effects. While improvement was observed in many patients, response rates varied, suggesting the need for individualized treatment approaches. Further controlled studies with larger sample sizes are recommended to establish definitive treatment protocols.

Keywords: Melisma; Hydroquinone; MASI score; Hyperpigmentation; Skin disorder

Introduction

A frequent acquired hyperpigmentation disease, Melasma is characterized by asymmetrical light to dark brown spots on the forehead, cheeks, upper lip, and chin. 1% to 50% are the range of prevalence rates among high-risk groups [1,2]. People with darker skin tones, expectant mothers, and people living in places with high UV exposure are high-risk groups. Centro-facial, malar, and mandibular patterns are among the distribution patterns of Melasma, with the former being the most prevalent. In certain cases, the upper back, extensor arms, and neck are also impacted. Menopausal women are most frequently found to have these non-racial zones. Erythema and telangiectasias have increased in the afflicted areas, according to recent research, which points to a vascular component to the illness [1]. Melasma occurs in all races and ethnicities, but the overwhelming majority of patients are

women and individuals with Fitzpatrick skin types IV through VI, including Hispanic, Asian, and individuals of African descent [1,4]. Less than 20% of Melasma instances are in men, making them the minority of patients. According to published research, men's and women's melisma shares many clinical and histologic characteristics [5,6]. One study reported low testosterone levels in men with Melasma [5]. It is often linked to a strong emotional impact by resulting in cosmetic facial deformity. There isn't a single, all-encompassing treatment for the illness; instead, different treatments have differing levels of efficacy, and the illness typically recurs [7]. Melasma treatment is still challenging, particularly for patients with dark skin. Before notable therapeutic improvements are observed, demelanizing agent treatment must be sustained for several months [8]. Treatment of Melasma involves the use of topical hypo-pigmenting agents, laser therapy and dermabrasion. Combination treatment of glycolic acid (2%) and hydroquinone (2%) have shown good results in several studies [9,10]. Hydroquinone (2%) has shown good results in several studies [10]. The skin is efficiently brightened and whitened by hydroquinone, a potent depigmenting chemical that completely blocks melanogenesis. Hydroquinone (HQ) constituents have strong antioxidant properties [11]. It affects both DNA and RNA production, which results in a reversible reduction of cellular metabolism. Being a weak substrate of tyrosinase and a strong melanocyte cytotoxic agent, hydroquinone competes with active melanocytes for tyrosine oxidation and prevents the skin's tyrosine from being converted to melanin [12]. The increased incidence of Melasma in pregnant women is evidence of its hormonal role on the etiology of the condition. Pregnant women frequently get Melasma, which is sometimes referred to as the "mask of pregnancy." In fact, 10–20% of patients receiving OCT have Melasma [13]. Since melisma is a common finding in pregnant women, it is often deemed the “mask of pregnancy”, with studies reporting a prevalence ranging from 36.4% to 70% [14]. Melanocyte-stimulating hormone (MSH), progesterone, and estrogen levels rise during pregnancy, promoting melanogenesis via a number of regulatory routes [15]. There are more progesterone receptors (PR) in the epidermal layer of melisma lesions than there are estrogen receptors (ER) in the dermal layer, according to research. Tyrosinase is activated when estrogen interacts with its receptors on melanocytes and keratinocytes, which in turn encourages melanogenesis. Furthermore, estrogen has the ability to increase the expression of PDZ domain protein kidney 1 (PDZK1) and α-melanocyte-stimulating hormone (α-MSH), which increases tyrosinase synthesis and melanin formation [16]. The impact of progesterone requires further clarification. However, sex steroid hormones are unable to induce hyperpigmentation alone; instead, they work synergistically with UVB radiation [17]. Chloasma gravid arum, sometimes known as the "mask of pregnancy," usually goes away on its own within a year after birth. However, in around 30% of women, it can last forever [14]. In a subgroup of patients, a favourable family history highlights the genetic susceptibility to developing Melasma. Indeed, research indicates that between 55 and 64 percent of Melasma patients report family relatives who have the disorder [18]. Along with sun exposure, a positive family history is the most prevalent risk factor identified in men, and in women, it is pregnancy. A therapeutic option for melisma is limited and the results are somewhere not satisfactory to some extent.

Methodology

It was an opened clinical trial study. The study was carried out for a period of 2 years from July 2022 to June 2024, in the outpatient of, National Institute of Diseases of the Chest and Hospital, Bangladesh. Patients suffering from melisma were selected as study population. Purposive type of non-probability sampling technique was followed. Data were recorded on pre designed data collection sheet. Within the period of data collection, 145 patients of melisma were assigned purposively considering exclusion and inclusion criteria of patient selection. The inclusion criteria were patient of 18 to 50 years of age group of male and female. Female not taking oral contraceptive pill and patient taking no other medication for Melasma treatment. Exclusion criteria were patient unwilling to give informed consent to take part in the study, pregnant woman, patient suffering from any endocrine disorder, liver disease, Patient taking oral contraceptive pill, phenytoin, me phenytoin. Informed consent was sought from the patients to take part in the study. At the baseline visit, history of melisma regarding length of time present, relationship to pregnancy, oral contraceptive,drug history was taken. Patients were asked about previous use of any other medications and any hypersensitivity to those agents. Patient were advised to apply the above-mentioned combination therapy over the melisma once daily in the night and the patient were asked to report on each and every 4th, 8th, 12th weeks of 2 years for evaluation. The efficacy was evaluated using Melasma Area and Severity Index (MASI) Score as proposed by Kimbrough-Green et.al. At each visit, side effects were determined in the treatment area.

MASI Score

Melasma area severity index (MASI) is developed by Kimbrough-Green et al16 for the assessment of Melasma. The severity of melisma of each of the four regions (forehead, right malar region, left malar region and chin) are assessed based on three variables: Percentage of the total area involved (A), darkness (D) and homogeneity (H). A numerical value assigned for the corresponding percentage area involved is as follows:

0 = No involvement

1 = < 10% involvement
2 = 10% - 29% involvement
3 = 30% - 49% involvement
4 = 50% - 69% involvement
5 = 70% - 89% involvement
6 = 90% - 100% involvement
The darkness of melisma (D) is compared to the
Normal skin and graded on scale of 0 - 4 as follows:
0 = normal skin colour without evidence of hyperpigmentation
1 = barely visible hyperpigmentation
2 = mild hyperpigmentation
3 = moderate hyperpigmentation
4 = severe hyperpigmentation
Homogeneity of hyperpigmentation (H) is also
Graded on scale of 0 - 4 as follows
0 = normal skin colour without evidence of
Hyperpigmentation
1 = specks of involvement
2 = small patchy area of involvement < 1.5 cm
Diameter
3 = patches of involvement > 2 cm diameter
4 = uniform skin involvement without any clear
Areas
To calculate the MASI score, the sum of severity Grade for darkness (D) and homogeneity (H) is multiplied by the numerical value of the areas (A) Involved and by the percentages of the four facial
Areas (10%-30%)
A = Area involvement, 0 = 0%, 1 = 10%, 2 = 10% - 29%, 3 = 30% - 49%, 4 = 50% - 69%, 5 = 70% - 89%, 6 = 90% - 100%
D = Darkness, 0 = absent, 1 = slight, 2 = mild, 3 = Marked, 4 = severe
H = Homogeneity, 0 = absent, 1 = slight, 2 = Mild, 3 = marked, 4 = severe

Results

It was an opened clinical trial study the study was carried out for a period of 2 years from July 2022 to June 2024, in the outpatient of National Institute of Diseases of the Chest and Hospital, Bangladesh. Patients suffering from melisma were selected as study population.

Discussion

It was an opened clinical trial study. The study was carried out for a period of 2 years from July 2022 to June 2024, in the outpatient of National Institute of Diseases of the Chest and Hospital, Bangladesh. To evaluate the efficacy of the hydroquinone for the treatment of facial Melasma. Patients suffering from Melasma were selected as study population. Within the period of data collection, 145 patients of Melasma were assigned purposively. The efficacy was evaluated using Melasma Area and Severity Index (MASI) Score. The severity of Melasma of each of the four regions (forehead, right malar region, left malar region and chin) are assessed based on three variables, percentage of the total area involved (A), darkness (D) and homogeneity (H).

***Table 1**: Socio-demographic characteristics of the respondents (n=145).*

Variables	n	%
Occupation		
Housewife	72	49.7%
Students	15	10.3%
Service holder	58	40.0%
Total	145	100%
Level of Education		
Primary level	15	10.3%
Secondary level	29	20.0%
Higher Secondary level	29	20.0%
Graduation level	15	10.3%
Postgraduate level (if applicable)	57	39.3%
Total	145	100%

***Table 2*: Distribution of the respondents by se (n=145).**

variables	n	%
Female	111	76.6
Male	34	23.4

***Table 3**: Socio-economic status of the respondents (n=145).*

Socio-economic Condition	n	%
Upper class	72	49.7%
Middle class	57	39.3%
Lower class	16	11.0%
Total	145	100%

***Table 4**: Socio-economic status of the respondents (n=145).*

Family history of melasma	n	%
Positive	29	20.0%
Negative	116	80.0%
Total	145	100%

***Table 5**: Distribution of the respondents by age at onset (n=145).*

Age Group (Years)	n	%
20-25	15	10.3%
26-30	25	17.2%
31-35	30	20.7%
36-40	35	24.1%
41-45	25	17.2%
46-50	15	10.3%
Total	**145**	**100%**

***Table 6**: Distribution of the patients by change in MASI Score after treatment (n=145).*

Change in MASI Score	n	%
Decreased by ≥ 8	25	17.2
Decreased by 4-7	35	24.1
Decreased by 1-3	30	20.7
No change	25	17.2
Increased by 1-3	15	10.3
Increased by ≥ 4	15	10.3
Total	145	100

Among the patients, 76.6% of the patients were female while 23.4% of the patients were male, which is accordance with the observations of many authors, which is again similar to the research work of Alicia Garcia, where 97% of the patients were female and 03% of the patients were male [19]. A strong family history of Melasma was present in 20% of the patient in this study and suggests an important genetic factor in the pathogenesis of this condition. With regard to the site of involvement of Melasma, 93% of the patients had malar distribution and 7% of the patients in this study had Centro facial distribution, which is similar to the research work of Alicia Garcia, where 91% of the patients had malar distribution and 9% of the patients had Centro facial distribution [19]. This study showed a little reduction of the severity of Melasma demonstrated by MASI score after 12 weeks of treatment when compared to their baseline. The result of this indicates that daily night use of the hydroquinone has a mild lightening effect on the Melasma. After 12 weeks, the average MASI score decreased by 20.7%. The limitations of the study were that it was an opened, randomized and controlled clinical trial study performed on a limited number of cases. Duration of the study was limited 2 years, which could not reflect the proper efficacy and possible side effects of proposed therapy. As study patients were mostly female and service holder, due to their lack of time and carelessness and most importantly their tendency to give more attention and priority to their family. So, unable to follow up and ensure their progress properly. Limitation of time and financial support of my study patients were my enormous restrictions. An attempt was made to evaluate the efficacy of hydroquinone in the treatment of Melasma. The study was carried out among 145 patients, fulfilling inclusion criteria for a period of 2 years. So, the result of this study may not be the representative of exact evaluation. It needs further elaborate study on a larger number of patients over a longer period of time. Still, it could be concluded that hydroquinone has a few lightening effects on melisma, with no remarkable side effects.

Conclusion

This study demonstrates that hydroquinone exhibits modest efficacy in the treatment of Melasma. The predominance of female patients and the presence of positive family history in a subset of cases aligns with existing literature regarding gender predisposition and genetic factors in Melasma pathogenesis. While many patients showed improvement in their MASI scores after each and every 12 weeks of treatment for 2 years, some experienced either no change or worsening of symptoms, suggesting that hydroquinone alone may not be sufficient for all patients. The study concludes that hydroquinone remains a viable treatment option for Melasma, offering mild to moderate improvement with minimal side effects.

References

1. Kim EH, Kim YC, Lee ES, Kang HY. The vascular characteristics of melasma. J Dermatol Science. 2007; 46: 111-116.
2. Werlinger KD, Guevara I, Gonzalez CM, Rincon ET, Caetano R, Haley RW, et al. Prevalence of self-diagnosed melasma among premenopausal Latino women in Dallas and Fort Worth. Tex Arch Dermatol. 2007; 143: 424-425.
3. Kang HY. Melasma and aspects of pigmentary disorders in Asians. Ann Dermatol Venereol. 2012; 139: S144-S147.
4. Rodrigues M, Pandya AG. Melasma: clinical diagnosis and management options. Australasian J Dermatology. 2015; 56: 151-163.
5. Sarkar R, Ailawadi P, Garg S. Melasma in men: A review of clinical, etiological, and management issues. J Clin Aesthet Dermatol. 2018; 11: 53-59.
6. Vachiramon V, Suchonwanit P, Thadanipon K. Melasma in men. J Cosmet Dermatol. 2012; 11:151-157.
7. Rigopoulos D, Gregoriou S, Katasambas A. Hyperpigmantation and melasma. J Cosmet Dermatol. 2007; 6: 195-202.
8. Prignano F, Ortonne JP, Buggiani G, Lotti T. Therapeutic approaches to melasma. Dermatol Clin. 2007; 25: 337-342.
9. Rendon M, Berneburg M, Arellano I, Picardo M. Treatment of melasma. J Am Acad Dermatol. 2006; 54: S272 -S281.
10. Pathak MA, Fitzpatrick TB, Parish JA. Treatment of melasma with hydroquinone. J Invest Dermatol. 1993; 76: 324-329.
11. Sanchez NP. Melasma: a clinical, light microscopic, ultrastructural and immunofluorescence study. J Am Acad Dermatol. 1981; 4: 698-710.
12. Lim JTE, Tham SN. GA peels in the treatment of melasma among Asian women. Dermatol Surg. 1997; 23: 177-179.
13. Bohm M. Disorders of Melanin Pigmentation. In Braun-Falco's Dermatology. Springer: Berlin/Heidelberg, Germany. 2022; 1013-1042.
14. Turkmen H, Yoruk S. Risk Factors of Striae Gravidarum and Chloasma Melasma and Their Effects on Quality of Life. J Cosmet Dermatol. 2023; 22: 603-612.
15. Filoni A, Mariano M, Cameli N. Melasma: How Hormones Can Modulate Skin Pigmentation. J Cosmet. Dermatol. 2019; 18: 458-463.

16. Rajanala S, Maymone MBC. Vashi NA. Melasma pathogenesis: a review of the latest research, pathological findings, and investigational therapies. Dermatol Online J. 2019; 25.
17. Artzi O, Horovitz T, Bar-Ilan E, Shehadeh W, Koren A, Zusmanovitch L, et al. The Pathogenesis of Melasma and Implications for Treatment. J. Cosmet Dermatol. 2021; 20: 3432-3445.
18. Ogbechie-Godec OA, Elbuluk N. Melasma: An Up-to-Date Comprehensive Review. Dermatol Ther. 2017; 7: 305-318.
19. Garcia A, Fulton JE. The combination of GA and hydroquinone or KA for the treatment of melasma and related conditions. Dermatol Surg. 1996; 22: 443-447.