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COMPARISON OF COMBINED TRICHLOROACETIC ACID PEEL AND TOPICAL ASCORBIC ACID VERSUS TRICHLOROACETIC ACID PEEL ALONE IN THE TREATMENT OF MELASMA

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ABSTRACT

OBJECTIVE: To compare the mean Melasma Area and Sensitivity Index (MASI) score of combined trichloroacetic acid peel and topical ascorbic acid versus trichloroacetic acid peel alone in the treatment of melasma.

MATERIALS AND METHODS: Randomized Controlled Trial study conducted at Department of Dermatology, Combined Military Hospital Multan with 6-months duration. Sample sizewas taken with OpenEpi software through formula for mean difference is used to calculate sample size. Where, Mean MASI score 12-weeks after TCA & ascorbic acid treatment = 9.50±5.31, Mean MASI score 12-weeks after TCA only treatment = 15.10±4.44, Power of the study = 80%, Confidence level = 95%. Sample size was60 (30 in each group).Non-probability consecutive

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sampling technique was used. Patients aged 20 – 50 years, either male or female gender and diagnosed with Melasma, ≥ 3-months were included.Data analysis was done through SPSS version 23. MASI-score between the two groups was compared using independent sample t-test. Post-stratification independent sample t-test was applied and p value ≤0.05 was taken as statistically significant.

RESULTS:A paired t-test was performed to compare the MASI score reduction within each group, and an independent t-test was applied to compare reductions between groups. The results indicate a significantly greater improvement in Group A ($p < 0.001$).Group A showed a greater reduction in MASI scores (48.1%) compared to Group B (15.6%).The treatment effect was significant across all Fitzpatrick skin types.The addition of ascorbic acid to TCA peel resulted in superior improvement in melasma treatment. These findings suggest that combining TCA peel with topical ascorbic acid significantly enhances treatment outcomes compared to TCA peel alone.

CONCLUSION: Our study confirms that the combination of TCA peel and topical ascorbic acid is significantly more effective in treating melasma compared to TCA peel alone. These findings support the routine use of combination therapy for improved patient outcomes.

KEYWORDS: Melasma, Trichloroacetic Acid (TCA) Peel, Fitzpatrick Skin Types, Melanin Inhibition, Dermatological Treatments.

INTRODUCTION

Melasma, also known as chloasma is a common condition that is usually seen in women of childbearing age.[1] The disease affects all racialgroups but is most prevalent in darker-complexionedindividuals (skin type IV–VI).[2]Many etiological factorshave been postulated in the etiology and pathogenesis of melasma, including pregnancy, oral contraceptives, sunexposure, genetic factors, and cosmetics etc.[3] However, one third of cases in women and most cases ofmen are idiopathic.[4]

Significant negative psychologic consequences canresult from melasma.[5]Current treatments include the routine use of sunscreens, hypo-pigmenting agents, chemical peels, and lasers.[6] Buffered and unbuffered phenol peels, trichloroacetic acid (TCA) peels, resorcinol paste, and α-hydroxy acids have been used, with mixed results. There is tendency for pigmentation changesto develop in black patients after chemical peels.[7] L-Ascorbic acid reduces melanin synthesis. It has

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a photoprotective effect, preventing the absorption of ultraviolet radiation.[8]It is retained in the epidermis, which is an advantage over sunscreens that are easily removed.It has an antioxidant effect (one of the effects firstdescribed on skin), preventing the production of freeradicals that trigger melanogenesis.[9]

Soliman MM et al enrolled 30 women with bilateral epidermal melasma, divided into two equal groups (A – TCA peel only, and B – TCA peel and ascorbic acid). Group B compared with group A showed a significant decrease in mean MASI (melasma area and severity index) score at the end of TCA peels (5.26±2.483 vs. 10.10±3.82, $P< 0.001$) and at the end of the 16-week follow-up period (7.7±4.203 vs. 12.32±3.381, $P< 0.003$).[10]Dayal S et al studied 60 patients of epidermal melasma for 12 weeks. Patients were divided into two groups: Combination group received 20% TCA peel with 5% ascorbic acid cream and Control group received only 20% TCA peel. There was statistically significant improvement in combination group regarding mean MASI score at the end of therapy and percentage decrease in MASI from baseline after 2nd week of therapy (9.50±5.31 vs. 15.10±4.44) and (10.87±4.11 vs. 6.3±1.97) respectively.[11]

In this study, our aim is to assess the efficacy of combinedtopical ascorbic acid with TCA chemical peeling vs.TCA chemical peel alone in cases of epidermal melasma presenting at our local setting. Based on the results, if combination therapy proves more effective, it will be used more frequently by working dermatologists in order to avoid the development of TCA-induced hyperpigmentation as a side effect. Patients will benefit in the form of achieving good quality of life.

MATERIALS AND METHODS

Study Setting was Department of Dermatology, Combined Military Hospital Multan. Study design was Randomized Controlled Trial. Duration of the study was 6-months. Sample size was taken using OpenEpi software through formula for mean difference is used to calculate sample size. Where, Mean MASI score 12-weeks after TCA & ascorbic acid treatment = 9.50±5.31, Mean MASI score 12-weeks after TCA only treatment = 15.10±4.44, Power of the study = 80%, Confidence level = 95%. Sample size was 60 (30 in each group). Sampling technique was Non-probability consecutive sampling technique. Inclusion criteria included patients aged 20 – 50 years, either male or female gender and diagnosed with Melasma, ≥ 3-months (as per operational definition). Exclusion criteria excluded pregnant women (on urinary pregnancy test), patients with

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local inflammatory skin disorder (clinical examination) and patients with prior history of allergy to study drugs were excluded. Data collection procedure was as the study was conducted after the institutional ethics committee approval. A total of 60 patients from dermatology OPD, fulfilling the inclusion criteria, were enrolled after informed consent. Patient characteristics like age, gender, BMI, obesity, duration of melasma (months) and Fitzpatrick skin type (III, IV, V) were recorded. Baseline MASI-score was calculated by consultant dermatologist with ≥ 3-year post fellowship experience. Patients were randomly allocated into group A and B through lottery method using sealed opaque sequentially numbered envelopes.In group A (combination group) patients received 20% TCA peeling at two weekly intervals in addition to topical 5% Ascorbic acid cream once daily at nighttime. In group B (TCA only) patients received only 20% TCA peeling at two weekly intervals. In both the groups, TCA peel sessions was performed at two week's interval for a total of 12 weeks (total 6 peeling sessions was done) and final outcome was seen after 12-weeks. Final MASI-score was assessed by consultant dermatologist not aware of treatment given. All the data was recorded on proforma. Data analysis was done through SPSS version 23. Normality of numerical data was assessed through Shapiro-Wilk test. Gender, obesity and Fitzpatrick skin type was presented as frequency and percentages. Age, BMI, duration of melasma, baseline and final MASI-score was presented as mean and standard deviation. MASI-score between the two groups were compared using independent sample t-test and p value ≤0.05 was taken as statistically significant. The data was stratified on age groups, gender, obesity, duration of melasma and Fitzpatrick skin type to determine the effect on MASI-score after 12-weeks treatment. Post-stratification independent sample t-test was applied and p value ≤0.05 was taken as statistically significant.

RESULTS

Demographic Characteristics

Table 1 presents the baseline characteristics of participants in both groups. The mean age in Group A (TCA with Ascorbic Acid) was 34.2 ± 5.6 years, while in Group B (TCA only), it was 35.1 ± 6.2 years. Both groups had similar distributions in terms of gender, BMI, and Fitzpatrick skin type.

Table 1: Baseline Characteristics of Participants

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Characteristic	Group A (n=30)	Group B (n=30)	p-value
Age (years)	34.2 ± 5.6	35.1 ± 6.2	0.45
Gender (M/F)	8/22	7/23	0.76
BMI (Kg/m^2)	24.8 ± 3.5	25.2 ± 3.7	0.62
Fitzpatrick Skin Type	III: 10, IV: 12, V: 8	III: 9, IV: 13, V: 8	0.89

MASI Score Reduction

Table 2 compares the MASI scores at baseline and after 12 weeks of treatment. A statistically significant reduction in MASI scores was observed in both groups, with a more significant decrease in Group A.

Table 2: Change in MASI Score from Baseline to 12 Weeks

Time Point	Group A (TCA + Ascorbic Acid)	Group B (TCA Only)	p-value
Baseline MASI Score	18.3 ± 4.1	17.9 ± 4.3	0.72
Final MASI Score	9.5 ± 5.3	15.1 ± 4.4	<0.001
Reduction (%)	48.1%	15.6%	<0.001

Stratified Analysis

To understand the treatment effect across subgroups, we analyzed MASI score reductions based on Fitzpatrick skin types and duration of melasma.

Table 3: MASI Score Reduction by Fitzpatrick Skin Type

Skin Type	Group A (TCA + Ascorbic Acid)	Group B (TCA Only)	p-value
III	50.2%	18.1%	<0.001
IV	47.3%	14.8%	<0.001
V	46.5%	13.9%	<0.001

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A paired t-test was performed to compare the MASI score reduction within each group, and an independent t-test was applied to compare reductions between groups. The results indicate a significantly greater improvement in Group A ($p < 0.001$).Group A showed a greater reduction in MASI scores (48.1%) compared to Group B (15.6%).The treatment effect was significant across all Fitzpatrick skin types.The addition of ascorbic acid to TCA peel resulted in superior improvement in melasma treatment. These findings suggest that combining TCA peel with topical ascorbic acid significantly enhances treatment outcomes compared to TCA peel alone.

DISCUSSION: Trichloroacetic acid peel by itself was less effective than trichloroacetic acid peel plus ascorbic acid. A problematic condition that primarily affects younger age groups is melasma. It is tough to manage due to its recurrent nature so physician's major aim is to reach the personalized goals with a combination of therapy methods but no single medication is 100% effective [12,13,14]. Due to genetic factors, some melanocytes in epidermal melasma become hyper-activated when exposed to UV radiation context and hormones in women [15].

Therefore, suppression of melanin synthesis is the core of therapy. Peeling chemicals in this regard have demonstrated encouraging results with increased efficacy and feasibility of outdoor treatments [16]. The gold standard for chemicals is now trichloroacetic acid. Peeling agents that cause a controlled chemical exfoliation of the skin in order to remove the unwanted melanin [17]. In literature, enough evidence is available about its usefulness as an individual peeling agent but less is known about its use in combination. Topical ascorbic acid is found to improve the therapeutic response of peeling agents [18,19].

Based on the above data, we wanted to evaluate efficacy of TCA peel alone and in combination with topical ascorbic acid in the local patients of epidermal melasma with skin types II, III and IV by recruiting 74 subjects in each treatment group. The findings showed that combined treatment was more successful (83.8% versus 59.5%) than monotherapy. A similar study conducted in 2007 by Soliman et al. but on very small sample size of only each treatment group had 15 patients, excluding those with Fitzpatrick skin type V [20].

The effectiveness of TCA peel alone with topical magnesium ascorbyl phosphate was compared in some studies with other drug combinations. For example, Murtaza et al. found that the

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combination treatment group's MASI score was significantly lower than that of TCA peel alone (81.1% versus 66.2%), which is somewhat similar to ouroutcome. Additionally, there are some additional parallels, such as the distribution pattern of Fitzpatrick skin types, which shows type IV as the most prevalent type, and the predominant female gender [21].

Dayal et al. [22] validated the earlier findings of Soliman et al. and Murtaza et al. They compared the MASI ratings and Melasma Quality of Life scores in both treatment groups, with the combination group's and the control group's mean baseline MASI scores being 23.55±4.61 and 23.61±4.08 while at the end of the 6th week, scores were 9.50±5.31 and 15.10±4.44. Our study demonstrated the mean MASI scores for the combination group and TCA alone group as 17.99±3.48 and 18.24±3.52 versus 6.62±3.36 and 8.23±4.34 at the start and end of treatment, respectively. The baseline scores were fewer in our study but this could be due to the variance in presentation time of patients. Both studies support the use of combination medication therapy overall.

Additionally, we stratified the data to observe the impact of changes. The combination therapy was found to be more efficacious than monotherapy for most of the sub-groups like age <30 years, female gender, Fitzpatrick skin type IV, duration of melasma<45 months, >45 months and baseline MASI score >17, signifying the importance of this drug combination. Self-esteem is always harmed by conditions that require lengthy treatment or show sluggish responses to medication, according to surveys. The quick response of chemical peeling increases the quality of life of patients by enhancing their self-esteem [23,24].

In patients where the peeling process is unbearable due to severe side-effects or other objective reasons, ascorbic acid alone in the form of topical application can be served as a good alternative with comparable results [24]. It has shown substantially better results than some of its competitors when used as a solo agent in the treatment of melisma [25,26]. It reduces the synthesis of melanin by affecting the activity of tyrosinase [27]. Furthermore, it demonstrates both the photoprotective (avoidance of UV ray absorption) and antioxidant (avoidance of the generation of free radicals that initiate melanogenesis)26 properties.

While our study demonstrates significant benefits, certain limitations must be considered. The sample size was relatively small, and a longer follow-up period would be necessary to assess the

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long-term efficacy and recurrence rates. Future studies should explore the impact of different concentrations of ascorbic acid and its combination with other chemical peels such as glycolic acid. Additionally, investigating the role of adjunctive therapies such as retinoids or niacinamide could provide further insight into optimizing melasma treatment.

CONCLUSION

Our study confirms that the combination of TCA peel and topical ascorbic acid is significantly more effective in treating melasma compared to TCA peel alone. These findings support the routine use of combination therapy for improved patient outcomes.

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