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CLINICAL EVALUATION OF TRICHLOROACETIC ACID (TCA) PEEL IN THE MANAGEMENT OF ACNE VULGARIS AND MELASMA

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Abstract

Background: The dermatological conditions that impact the patients quality of life and mental well-being include acne vulgaris and melasma. Trichloroacetic acid (TCA) and other chemical peels have been popular in dermatology as therapeutic agents in the treatment of skin texture and pigmentation disorders.

Objective: To clinically assess the effectiveness of trichloroacetic acid (TCA) peel in curing acne vulgaris and melasma, as well as compare the treatment results in these conditions.

Methodology: Clinical cross-sectional study was done in the patients presenting themselves with acne vulgaris and melasma. The participants were classified by their gender, diagnosis, the length of the disease and baseline severity. TCA peel was used in

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line with the usual dermatological guidelines. The SPSS was used to code and analyze the data. Measures of treatment response were evaluated in the terms of baseline severity versus post-treatment severity, statistical analysis was carried out in order to find out associations, effectiveness.

Results: The researchers proved that acne vulgaris and melasma were significantly reduced after the use of TCA peel. A greater and more stable decrease in pigmentation was however noted among the patients with melasma than in the changes experienced in acne lesions. Conversely, the responses of the patients of acne vulgaris were more diverse. TCA peel was found to be more effective in the management of melasma with the support of statistical analysis.

Conclusion: TCA peel is a good treatment modal used in the treatment of acne vulgaris, as well as melasma, although its clinical efficacy is better on the treatment of melasma. TCA peel is arguably a treatment of choice in pigmentation disorders (melasma), and is an ancillary treatment in the management of acne.

INTRODUCTION

The acne vulgaris and melasma are two of the most prevalent dermatological disorders among people in various parts of the world especially among younger and middle aged citizens. These are very common conditions that are often met in the dermatology practice because they are very prevalent. They considerably change the face and in most cases are linked to cosmetic issues. The pressures of these disorders are rising with the changing lifestyle and the environmental conditions. It is necessary to have early acknowledgement and proper management to minimize the complications in the long term [9]. Chemical peels have proved to serve as a therapeutic agent to the treatment of both acne and pigmentation disorders. They do this by shedding the skin and stimulating the formation of healthier layers. Trichloroacetic acid (TCA) is one of many commonly used agents of peeling because it produces predictable effects. It is said to be economical and it can be applied on various types of skins. Its more use in dermatology since it is used to enhance inflammatory and pigmentary diseases [15].

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Acnes vulgaris is a long-term inflammatory disease of the pilosebaceous unit, which is manifested by comedones, pustules, nodules, and papules. It is prevalent in adolescents, and it may continue through adulthood. This condition is characterized by an augmentation in the production of sebum and follicular obstructing. The further causes of inflammation and lesions formation are the colonization of bacteria. In the untreated case, it may lead to permanent pigmentation and scarring [4]. Different modalities of treatment have been investigated to manage acne such as the chemical peeling agents. TCA peel has demonstrated success in decreasing the acne lesions and also enhancing a better texture of the skin. It acts by stimulating exfoliation and reducing the follicular obstruction. Its use in the treatment of mild to moderate acne has been proved by clinical studies to be effective. The treatments assist in attaining excellent cosmetic results and patient contentment [8].

Melasma is a widespread acquired hyperpigmentation disease, which is marked by symmetrical brown spots on the face. It is more common in the females and the people of darker skin complexions. The disease is closely linked to sun and the hormones. It normally attacks the cheeks, forehead and upper lip. Melasma is a chronic condition that is likely to recur following treatment [1]. Different treatment avenues have been endeavored with the aim of treating melasma. Known to be promising, chemical peels and especially TCA have shown to be effective in pigmentation reduction. They act on eliminating pigmented layers and stimulating renewal in the skin. Combination therapies also improve the treatment. It needs to be followed up and sun-protected over a long term [5].

Acne vulgaris is one of the skin disorders that has a high prevalence among the adolescent population across the globe. It is mild to severe among various populations. It plays an important role in the dermatological consultations throughout the world. The condition has a significant burden to the healthcare systems. The initial management is necessary to minimize complications and enhance the outcomes [10]. The prevalence of melasma is also high especially in people with darker skin levels. It is usually seen among the Asian people and the tropical ones. The ultraviolet

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radiation is one of the environmental factors that significantly contribute to its development. The two are both long-term conditions that need long-term treatment interventions. There has to be good and available treatments to deal with this increasing load [13].

The presence of acne and melasma contributes to the deterioration of the quality of life of patients as it is visible. They tend to cause low self-esteem and confidence. The patients can develop emotional distress and social withdrawal. The psychological stress can be similar to the other long term medical conditions. Treatment of these ailments is relevant in enhancing the general wellness [9]. Treatment does not only help in improving physical appearance, but also in the psychological health. The dermatological cosmetic treatment like the chemical peels has delivered good results. There are other instances where patients will seek therapy mainly due to cosmetic reasons. The enhancement of skin condition results in enhancing social interactions. Optimal care of the patient requires a holistic approach [14].

Acne pathophysiology includes the elevated sebum, hyperkeratinization of the follicles, and the microbial colonization. The factors are associated with hair follicle obstruction and lesion. The condition is further worsened by inflammatory processes. There is a strong role of hormonal factors, especially androgens. It is significant to understand these mechanisms in order to have targeted therapy [10]. Chemical peels are used in the treatment of acne as it exfoliates the dead skin cells and also decreases follicular plugging. They are also reduce the bacterial weight and enhances skin turnover. This leads to the mitigation of the inflammatory and non-inflammatory lesions and frequent care can preserve clarity of skin. The procedures are useful complements in the management of acne [12].

Increased production of melanin and deposition of pigment abnormally in the skin causes melasma. One of the major stimulators of melanocyte is the ultraviolet radiations. It is also caused by hormonal factors like pregnancy and oral contraceptives. Susceptibility has genetic predisposition. It is a chronic condition that cannot be eliminated shortly [2]. Melasma can be treated with chemical peeling using TCA which exfoliates the pigmented areas. They enhance

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pigmentation and regeneration of new skin. The response to treatment depends on depth of the pigment. Epidermal melasma is more responsive than the dermal ones. Constant sun protection should be used to avoid reoccurrence [13].

There are treatment interventions to acne and melasma that are topical, systemic, and procedural. Typical interventions are the retinoids, antibiotics, and the depigmenting agents. Sunscreens are necessary in the disease progression prevention. Nonetheless, these treatments can be limited including side effects and relapse. Thus alternative practices are usually taken into consideration [9]. The chemical peels are an efficient alternative or complementary treatment. They enhance the skin texture and the pigmentation by balancing exfoliation and often combination therapies are the most successful. The compliance of a patient is an important factor in the success of treatment. It should also be followed up regularly to sustain outcomes [15].

The chemical peel entails the use of chemical peels to promote the process of controlled skin exfoliation. This causes the dead layers of the skin to be removed and new cells to be regenerated. The peels have been classed as superficial, medium and deep depending on the level of penetration. They are commonly applied in the treatment of acne, melasma and photoaging. The use of proper technique is the only way to be safe and effective [6]. The research on clinical efficacy of using chemical peels in dermatology practice has proven its effectiveness. They enhance the skin texture, skin tone and general appearance. Patient selection can be achieved to get the best outcomes. This is because post-procedure care decreases the chances of complications. These are procedures that are popular in cosmetic dermatology [11].

Acne vulgaris has been one of the most prevalent skin disorders with a tendency to bring a lot of physical and psychological pain. Scars left behind after acne especially ice-pick scars are very common in individuals who suffer acne. A research comparing the efficacy of 25% trichloroacetic acid (TCA) chemical peel with dermasanding in treating acne scars identified encouraging results, with good changes in the appearance and texture of the skin scars. TCA chemical peels have been credited with epidermal exfoliation, collagen stimulant and

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enhancement of the overall skin texture. It was shown that TCA/dermasanding combination is especially effective with deep acne scars, which tend to remain persistent to more superficial methods of treatment. The penetration of TCA deep into the skin and breaking of scar tissue results in less scar on the skin and a smoother skin. This research highlights the significance of TCA peels in the treatment of acne related skin injuries, which demonstrates that TCA peels are a handy solution to improving the skin looks of acne patients. The effectiveness of the treatment in the reduction of the depth of scars and bettering of the skin texture underscores its applicability in the treatment of severe acne scarring [16].

Rationale of the study

This cross-sectional study aims at assessing the clinical efficacy and safety of Trichloroacetic Acid (TCA) peel in the treatment of acne vulgaris and melasma. The two conditions are chronic and usually recurrent, scarring and post-inflammatory hyperpigmentation especially in people of darker skin complex. Despite the wide utilization of TCA peels, issues of adverse effects, like burning, stinging, and pigmentary, are still of great concern. To evaluate treatment outcomes, tolerability as well as risks involved, there is a need to produce locally relevant data in Pakistani patients. The present research will compare the efficacy of TCA peel in acne and melasma and, therefore, will help dermatologists to choose correct treatment regimens, reduce adverse effects, and stimulate the overall effect of treatment.

LITERATURE REVIEW

Dayal et al. (2017) conducted a clinical interventional study to assess the effectiveness and safety of 20% trichloroacetic acid (TCA) peel, used with topical 5% ascorbic acid, to treat melasma. The patients with epidermal melasma participated in the study and were evaluated after the improvement of epidermal melasma with the help of the standardized clinical pigmentation scoring systems. Before the start of treatment, the severity of melasma was documented. The findings indicated a great improvement in the severity of the melasma with combined therapy.

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The patients showed improved results as opposed to literature reported monotherapy methods. Transient erythema and burning sensation were slight side effects that occurred during treatment sessions. Depigmenting effects were increased by adding ascorbic acid that suppressed the production of melanin. The paper has focused on better patient satisfaction with combination therapy as a result of observable cosmetic enhancement. There were no significant side effects or any chronic complications reported. This paper has found that TCA and ascorbic acid is both safe and effective as a modality of managing melasma [29].

Begum et al. (2016) conducted a comparative clinical study to compare the effectiveness of 30% trichloroacetic acid peel with 35% glycolic acid peel in the treatment of melasma. The research was done using two treatment groups of patients who were followed during various sessions. Pigmentation scores were measured as baseline scores and these were assessed prior to the initiation of treatment. Findings indicated that both groups showed great improvement on pigmentation after treatment. TCA peel, however, demonstrated relative superiority in terms of decreasing the scores of severity of melasma. The smaller number of side effects was related to glycolic acid peel, which was characterized by slower clinical response. Deep penetration led to mild burning and erythema that were prevalent in the TCA group. The authors talked of the efficacy versus safety ratio in the selection of peeling agents. TCA demonstrated a greater level of dermal activity that resulted in greater pigment clearance. The researchers concluded that TCA peel is better than glycolic acid peel in the treatment of melasma [30].

Maruma et al (2025) conducted a retrospective cross-sectional study to determine the safety and efficacy of sequential high-concentration glycolic acid and TCA peels in skin phototypes IV-VI. The patients with darker skin type that is likely to be affected by pigmentation disorders were specifically targeted by the study. The improvement in pigmentation and skin texture served as the clinical outcomes. Findings indicated a great improvement in hyperpigmentation after treatment. The sequential peeling showed enhanced results relative to the use of single agents. The researchers mentioned few adverse effects with the use of the proper protocols. The

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inflammatory pigmentation, on the contrary, was not widespread and was post-inflammatory, as the application methods were controlled. The authors pointed out the role of patient selection and technique carefulness in the dark skin. A combination and sequential peel improved the therapeutic outcomes to a great extent. The findings of the study were that TCA-based regimens are safe and effective in increased skin phototypes with caution [31].

Khashaba et al. (2024) carried out a comparative study to determine the effectiveness of TCA peel at 15% individually and with microneedling among patients with acanthosis nigricans. Albeit not directly related to acne or melasma, the study gives an idea of the use of TCA in pigmentary disorders. The participants were the patients having hyperpigmented lesions and undergoing treatment sessions. The outcomes revealed that combination therapy resulted in excellent improvement, as compared to TCA. TCA had increased penetration by use of micro needling resulting in better therapeutic effects. Significant pigmentation decrease and skin texture improvement were demonstrated in the patients. Side effects were insignificant and comprised of mild erythema and temporary discomfort. It was reported that there is a synergistic effect in using physical and chemical modalities. TCA was also active as a solution on its own. The researchers have come to the conclusion that the combination methods could be used to improve the efficacy of TCA-based treatment [32].

Damasceno et al. (2018) explained the clinical use, as well as the mechanism, of trichloroacetic acid (TCA) peel in the dermatological practice. The paper described that TCA works by bringing about controlled protein coagulation in epidermal and dermal skin layers. This controlled injury induces exfoliation and re-generation of new and healthier skin. Peeling concentration and layers will affect the depth of the peeling. The lower concentrations have superficial effects and the high concentrations travel deeper into the dermis. TCA has had extensive application in the treatment of acne, photoaging, and melasma. The research paper has highlighted that TCA offers consistent and reliable penetration relative to other peeling agents. It also emphasized on the need to have good application technique to avoid complications. A post-

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procedure plan (such as sun protection and moisturization) was deemed to be a key to achieving the best outcomes. The research came to a conclusion that TCA peel is a highly applicable, effective and versatile dermatological procedure [33].

Obagi et al. (2020) study has addressed medium-depth peels and trichloroacetic acid blue peel in cosmetic dermatology. The paper described that TCA blue peel enables superior visualization and control of the depth of penetration when used. This method is safer and the peeling is evenly spread throughout the region being treated. It is generally applied in the treatment of the acnes scars, pigmentation disorders and photoaged skin. The process enhances skin reorganization and activates collagen synthesis. There were recorded great improvements in skin texture, skin tone and appearance. The paper has focused on the importance of physician experience in realizing the best outcomes. Side effects were mild and self-limiting like erythema, peeling, and transient discomfort. The correct selection and preparation of the patient contributed to the minimization of complications. The researchers found out that TCA blue peel is a safe and effective medium depth peel method in skin care [34].

Adamczyk et al. (2022) introduced a case study to assess the impact of serial TCA interventions on the levels of sebum and acne scars. The experiment entailed frequency repetitions of TCA within a specified period of time. Findings indicated a significant decrease in the level of sebum among the treatment sessions. The acne scars and skin texture were also improved. Opposite improvement was observed in the overall skin appearance of patients. The treatment course did not report any severe or chronic side effects. Diluted erythema and peeling were noted but did not need treatment. The paper has brought out the importance of TCA in regulating the production of oil and the severity of acne. It has also highlighted its efficacy in stimulating collagen remodelling of scarred skin. It was concluded that recurrent treatments with TCA are helpful in the treatment of acne scars and the decrease of the levels of sebum [35].

Al Hussein et al. (2015) performed a comparative study to assess the use of TCA peel in comparison to 15% topical azelaic acid gel. The patients were separated into two categories where

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they were administered either with the procedures or topical treatment. The standardized acne severity grading scales were used to measure the improvement of the clinical condition. The outcome was significant improvement in acne lesions in both groups. TCA peel however showed greater improvement and faster than those of azelaic acid. The topical group experienced gradual improvement and reduced number of side effects. MCA group had more slight irritation, erythema, and peels. The paper presented the benefits of procedural therapy when it comes to producing fast outcomes. TCA was also observed to be more effective in mild cases of acne. The researchers made a conclusion that TCA peel is a better alternative than azelaic acid in the treatment of acne [36].

Kadunc et al. (2018) addressed the idea of adding trichloroacetic acid peel to other dermatological procedures to improve the results. The paper has identified that a combination therapy is effective in treating acne and pigmentation disorders. The combination of TCA with agents like glycolic acid, microneedling agent or topical depigmenting agent is possible. Such formulations promote permeability and treatment outcomes of the peel. The paper highlighted the need to conduct individualized treatment planning depending on the skin type and condition of the patient. Cautions are critical during the integration of more than one procedure. Mediated usage minimizes the potential side effects. Combination therapy is also effective especially in recalcitrant or recurrent cases. It results in improved patient satisfaction and clinical outcomes. The study came up with the conclusion that the combined TCA methods produce better outcomes as opposed to the single modalities of treatment [37].

Fanous et al. (2017) outlined a universal procedure of TCA peel that can be used with both light and dark skin. The experiment was aimed at the creation of a universal procedure of safe application in various types of skin phototypes. The findings indicated successful enhancement of pigmentation, skin texture as well as general appearance. The method reduced chances of post inflammatory hyperpigmentation particularly in dark skin. Uniform application was controlled which resulted into consistent results. It was known to be safe when the procedure is done by

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trained professionals. Peeling and erythema were mild side effects that were not long lasting. The research underlined the significance of the correct technique and clinical skills. It also emphasized the flexibility of TCA peel in various patients. The paper came up with the conclusion that TCA peel is safe and effective and it can be applied in all skin types with proper precautions [38].

3.1: OBJECTIVE

To clinically assess the effectiveness of trichloroacetic acid (TCA) peel in curing acne vulgaris and melasma, as well as compare the treatment results in these conditions.

3.2: PROBLEM STATEMENT

Acne vulgaris and melasma are highly prevalent dermatological conditions that significantly affect patients' quality of life and cosmetic appearance. Although multiple treatment options are available, achieving consistent, safe, and long-term therapeutic outcomes remains a major clinical challenge. Trichloroacetic acid (TCA) peel is widely used in dermatology; however, its comparative effectiveness in the management of acne vulgaris and melasma, particularly in darker skin types, is not clearly established. Therefore, there is a need to evaluate the efficacy and safety of TCA peel to guide appropriate treatment selection, improve clinical outcomes, and minimize complications.

3.3: OPERATIONAL DEFINITION(S)

Acne Vulgaris:

The term acnes vulgaris refers to a long-term inflammatory disease of the pilosebaceous unit that is manifested by the presence of comedones, papules, pustules, and even nodules due to hyperproduction of sebum, hyperkeratinization of follicles and colonization by microbes [10].

Melasma:

According to the definition, Melasma is an acquired hyperpigmentation disorder that develops as symmetrical brown or grayish spots on sun-exposed regions of the face, which is most often related to ultraviolet exposure and hormonal activity [13].

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Trichloroacetic Acid (TCA) Peel:

Trichloroacetic acid (TCA) peel can be defined as any chemical peeling procedure when TCA is applied on the skin to cause controlled chemical exfoliation resulting to new epidermal sheets or enhancement of pigmentation and acne lesions [9].

Efficacy of Treatment:

Efficacy of treatment refers to the levels of clinical improvement of acne or melasma lesions achieved after TCA peel in terms of reduction in the number of lesions, pigmentation, or other standardized clinical scoring systems [1] .

Safety of Treatment:

The concept of safety of treatment implies the lack of or minimum presence of undesirable events, including erythema, burning, post-inflammatory hyperpigmentation or scarring after TCA peel application [16].

MATERIAL AND METHODS

4.1: Study Design:

A cross-sectional study to evaluate the clinical skin changes in the patients of acne, melasma using TCA peel for treatment.

4.2: Settings:

Dermatology outpatient department, tertiary care hospital, Aesthetic clinics in Lahore.

4.3: Study Duration:

Four months (after approval of synopsis).

4.4: Sample Size:

Each group was 40 sample size and total was 80.

4.5: Sampling Technique:

A (Non-probability) convenient sampling technique was applied.

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4.6: Sample Selection:

4.6.1: Inclusion Criteria:

1. Clinical diagnosis of acne vulgaris or melasma in patients.
2. Age population between 18-45 years.
3. Patients of either gender.
4. Patients who are willing to have the treatment sessions of TCA peel.
5. Patients with mild-to-moderate severity of the disease.

4.6.2: Exclusion Criteria:

1. Active skin infections (bacterial, viral or fungal) in patients.
2. Patients who have had keloids or hypertrophic scars. Patients who are found to be hypersensitive to TCA or chemical peels.
3. Patients that have had new chemical peel or dermatological treatment.
4. Patients who have severe acne or severe melasma and need different treatment.
5. Lactating or pregnant women.

4.7: Scanning Technique:

Aesthetic assessment of the acne vulgaris and melasma has been done using direct visual inspection in sufficient light conditions. Clinical scoring systems and lesion counting were used to perform the standardized baseline assessment. The images of the affected areas were captured before the and after the treatment sessions digitally using the same camera settings and angles. Regular follow-up assessments were done to measure treatment response and side effects. All the observations were taken in a systematic manner so as to provide consistency and data reliability.

4.8: ETHICAL CONSIDERATIONS

- Written informed consent attached was taken from all the participants.
- All information and data collection were kept confidential.
- Participants were remained anonymous throughout the study.

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- The subjects were informed that there are no disadvantages or risk on the procedure of the study.
- They were also be informed that they will be free to withdraw at any time during the process of the study.
- Data was kept in under key and lock while keeping keys in hand. In laptop it was kept under password.

4.9: DATA COLLECTION PROCEDURE

The selection of the patients meeting the inclusion criteria involved the non-probability consecutive sampling method. Baseline demographic and clinical data were collected after the informed consent was obtained. The severity of acne and melasma was determined by the use of the standardized clinical scoring systems. The TCA peel was used as per the protocol with the patients being followed at regular intervals. A structured proforma was used in recording clinical outcomes and adverse effects systematically.

4.10: DATA ANALYSIS PROCEDURE

The SPSS software (version 26.0) was used to enter and analyze the data. Mean ± standard deviation was used to show quantitative variables whereas frequencies and percentages were used to show qualitative variables. Chi-square test was used on the categorical variables and independent t-test on the continuous variables. A p-value ≤ 0.05 had been taken as significant.

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RESULTS

Table 1: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	80	18	45	29.24	6.063
Gender	80	1	2	1.49	.503
Diagnosis	80	1	2	1.50	.503
Severity Baseline	80	0	2	1.03	.811
Clinical Improvement	80	0	2	.79	.807
Patient Satisfaction	80	1	3	2.10	.773
Valid N (listwise)	80				

Interpretation

Mean age of the participants was 29.24 ± 6.06 years. Distribution of the diagnosis and the gender was nearly equal, indicating balanced sample population.

Table 2: Gender Distribution

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	41	51.2	51.2	51.2
	FEMALE	39	48.8	48.8	100.0
	Total	80	100.0	100.0	

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Interpretation

The gender distribution was nearly equal with 51.2% males and 48.8% females and indicating no gender bias in the sample.

Table 3: Clinical Improvement Distribution

Clinical Improvement					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	51–75%	36	45.0	45.0	45.0
	25–50%	25	31.3	31.3	76.3
	>75%	19	23.8	23.8	100.0
	Total	80	100.0	100.0	

Interpretation

Most patients (45%) achieved 51–75% improvement while fewer patients (23.8%) showed the greater than 75% improvement.

Table 4: TCA Concentration Distribution

TCA Concentration					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20	40	50.0	50.0	50.0
	25	23	28.7	28.7	78.8
	30	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

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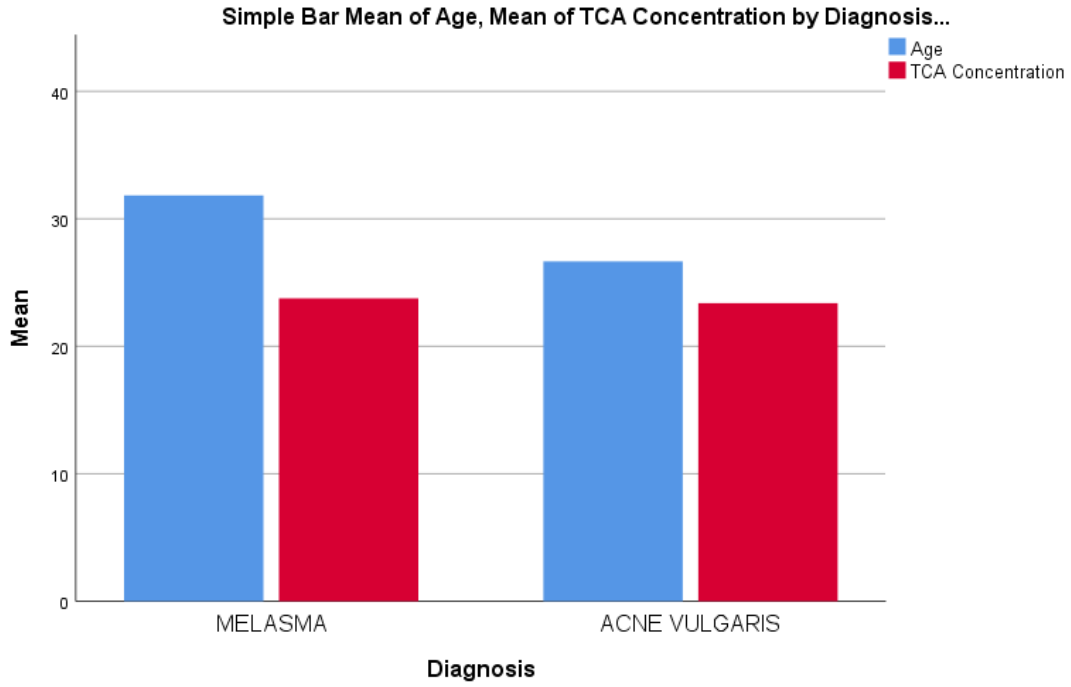
Interpretation

Most commonly used TCA concentration was 20% (50%), followed by 25% and 30% concentrations.

Figure 1: Comparison of Mean Age and TCA Concentration According to Diagnosis



Interpretation

Mean age was higher in the melasma patients compared to acne vulgaris while TCA concentration was nearly similar in both groups. It indicates comparable treatment strength despite differences in the patient age between the two diagnoses.

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Table 5: Diagnosis vs Clinical Improvement

Diagnosis * Clinical Improvement Crosstabulation						
			Clinical Improvement			Total
			51–75%	25–50%	>75%	
Diagnosis	MELASMA	Count	21	0	19	40
		% within Diagnosis	52.5%	0.0%	47.5%	100.0%
	ACNE VULGARIS	Count	15	25	0	40
		% within Diagnosis	37.5%	62.5%	0.0%	100.0%
Total		Count	36	25	19	80
		% within Diagnosis	45.0%	31.3%	23.8%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.000[a]	2	.000
Likelihood Ratio	62.002	2	.000
Linear-by-Linear Association	3.248	1	.072
N of Valid Cases	80		

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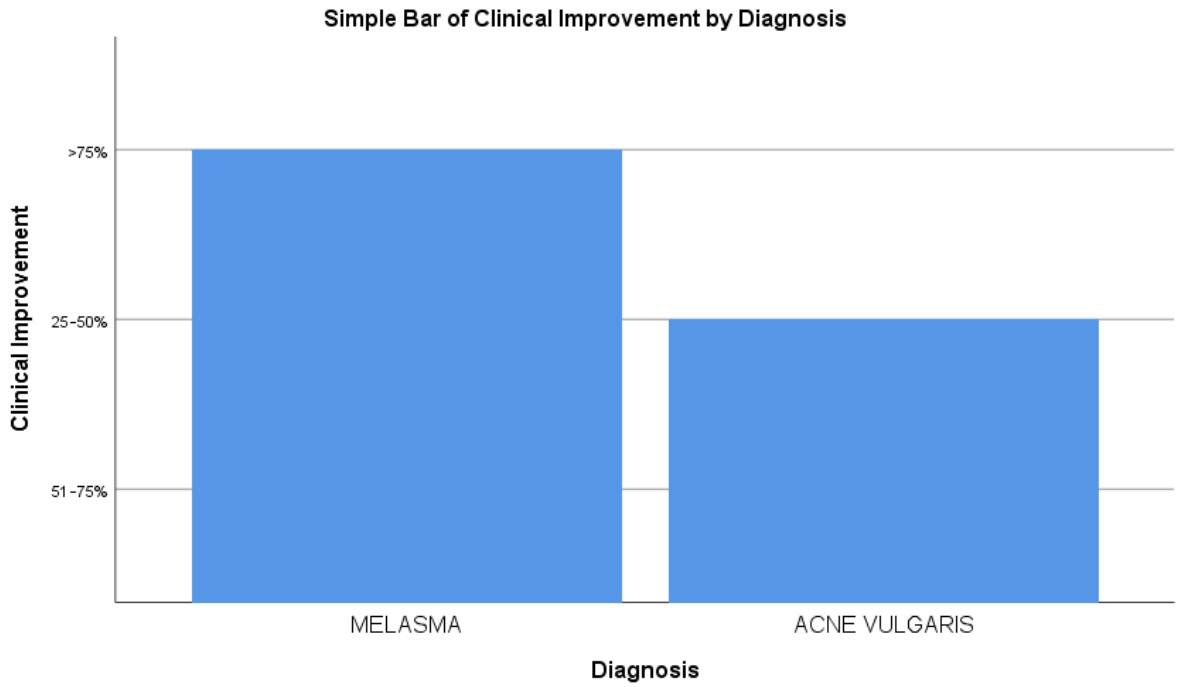
Interpretation

The highly significant association was observed between the diagnosis and clinical improvement ($p < 0.001$) with melasma patients showing markedly better outcomes than the acne vulgaris.

Figure 2: Clinical Improvement



Interpretation

Majority of the patients showed moderate improvement (51–75%) with fewer achieving the high-level improvement.

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Table 6: Diagnosis vs Side Effects

Diagnosis * Side Effects Crosstabulation					
			Side Effects		Total
			NO	YES	
Diagnosis	MELASMA	Count	29	11	40
		% within Diagnosis	72.5%	27.5%	100.0%
	ACNE VULGARIS	Count	18	22	40
		% within Diagnosis	45.0%	55.0%	100.0%
Total		Count	47	33	80
		% within Diagnosis	58.8%	41.3%	100.0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.241[a]	1	.012		
Continuity Correction[b]	5.158	1	.023		
Likelihood Ratio	6.336	1	.012		
Fisher's Exact Test				.022	.011
Linear-by-Linear Association	6.163	1	.013		
N of Valid Cases	80				

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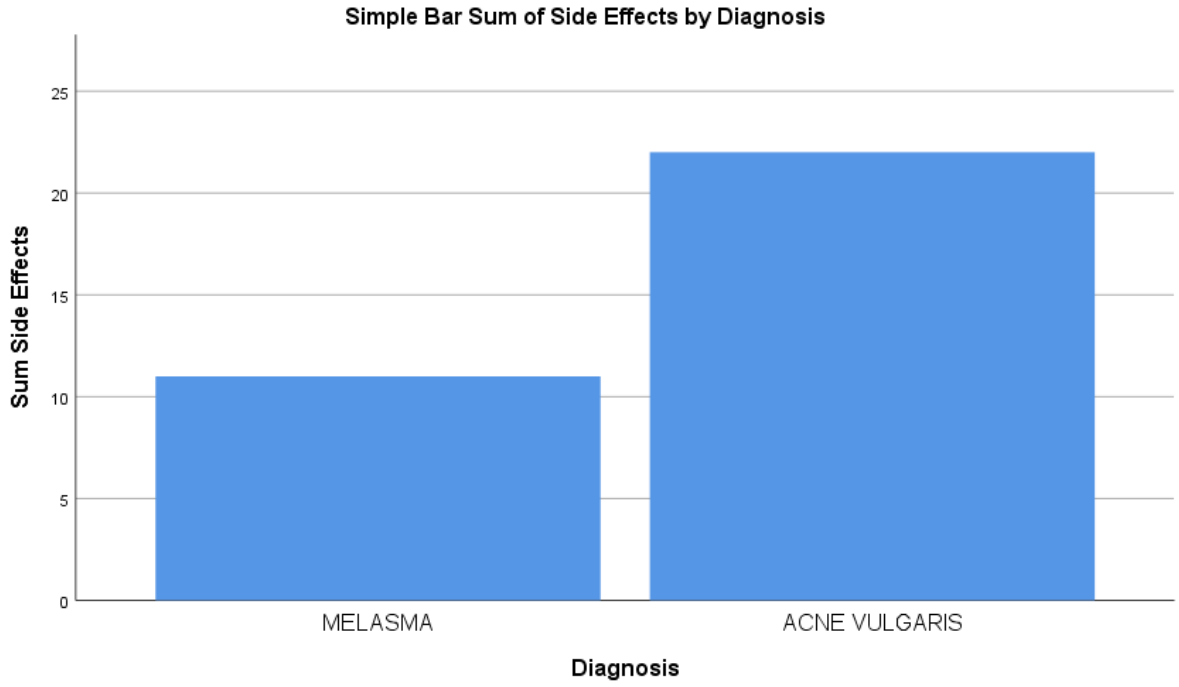
Interpretation

The statistically significant association was found between the diagnosis and the side effects (p = 0.012), with acne vulgaris patients experiencing more the complications.

Figure 3: Diagnosis vs Improvement



Interpretation

Melasma patients demonstrated significantly higher the clinical improvement compared to the acne vulgaris patients.

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Table 7: Diagnosis vs Patient Satisfaction

Diagnosis * Patient Satisfaction Crosstabulation						
			Patient Satisfaction			Total
			EXCELLENT	GOOD	FAIR	
Diagnosis	MELASMA	Count	20	20	0	40
		% within Diagnosis	50.0%	50.0%	0.0%	100.0%
	ACNE VULGARIS	Count	0	12	28	40
		% within Diagnosis	0.0%	30.0%	70.0%	100.0%
Total		Count	20	32	28	80
		% within Diagnosis	25.0%	40.0%	35.0%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	50.000[a]	2	.000
Likelihood Ratio	68.564	2	.000
Linear-by-Linear Association	48.203	1	.000
N of Valid Cases	80		

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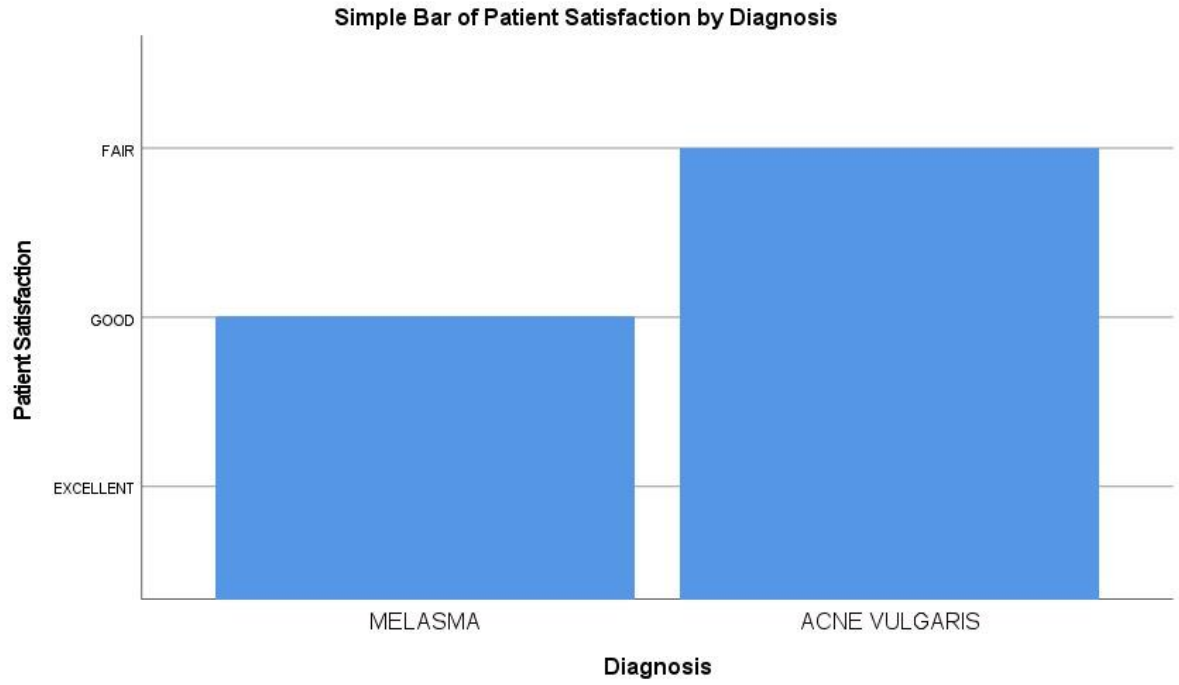
Interpretation

Patient satisfaction was the significantly associated with the diagnosis ($p < 0.001$), with melasma patients reporting higher satisfaction levels compared to the acne vulgaris.

Figure 4: Diagnosis vs Patient Satisfaction



Interpretation

Melasma patients reporting higher satisfaction levels compared to the acne vulgaris.

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Table 8: Severity vs Clinical Improvement

Severity Baseline * Clinical Improvement Crosstabulation						
			Clinical Improvement			Total
			51–75%	25–50%	>75%	
Severity Baseline	MILD	Count	11	9	5	25
		% within Severity Baseline	44.0%	36.0%	20.0%	100.0 %
	MODERATE	Count	14	7	7	28
		% within Severity Baseline	50.0%	25.0%	25.0%	100.0 %
	SEVERE	Count	11	9	7	27
		% within Severity Baseline	40.7%	33.3%	25.9%	100.0 %
Total		Count	36	25	19	80
		% within Severity Baseline	45.0%	31.3%	23.8%	100.0 %

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)

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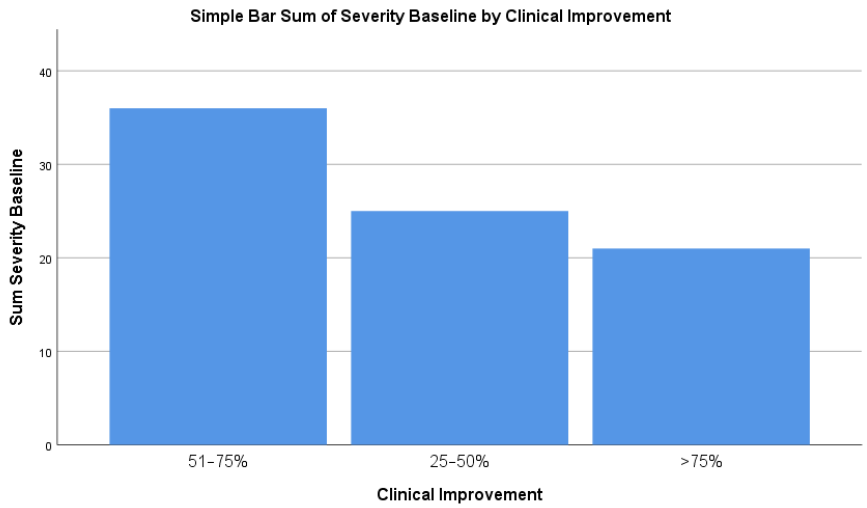
Pearson Chi-Square	1.058[a]	4	.901
Likelihood Ratio	1.080	4	.897
Linear-by-Linear Association	.174	1	.677
N of Valid Cases	80		

Interpretation

No significant association was found between the baseline severity and the clinical improvement (p = 0.901), indicating treatment response was independent of the severity.

Figure 5: Severity vs Improvement



Interpretation

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Majority of the patients achieved 51–75% clinical improvement across all the baseline severity levels. No clear association between the baseline severity and the level of improvement was observed.

Table 9: TCA Concentration (Group Statistics)

Group Statistics					
	Diagnosis	N	Mean	Std. Deviation	Std. Error Mean
TCA Concentration	MELASMA	40	23.75	4.043	.639
	ACNE VULGARIS	40	23.38	3.985	.630

Interpretation

Mean TCA concentration used was the comparable between melasma (23.75 ± 4.04) and the acne vulgaris (23.38 ± 3.98) groups, indicating the similar treatment strength in the both groups.

Table 10: TCA Concentration (Independent Samples T-Test)

Independent Samples Test								
	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference

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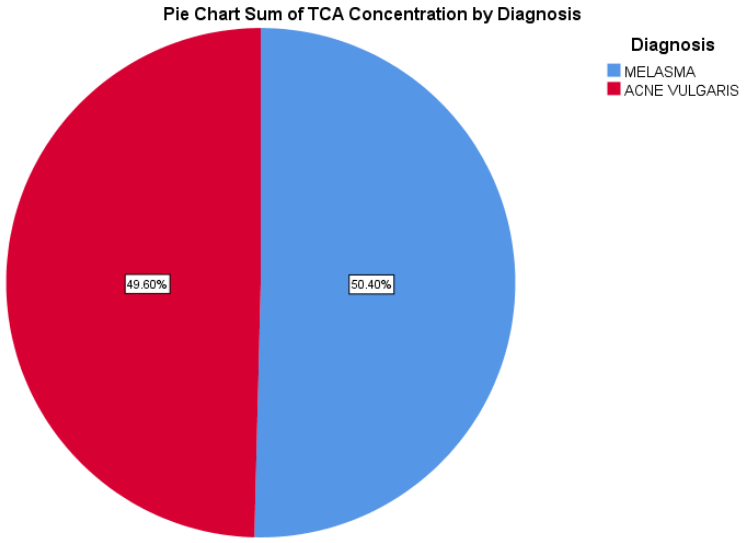
									Lower	Upper
TCA Concentration	Equal variances assumed	.002	.963	.418	78	.677	.375	.898	-1.412	2.162
	Equal variances not assumed			.418	77.984	.677	.375	.898	-1.412	2.162

Interpretation

No statistically significant difference was observed in the mean TCA concentration between melasma and the acne groups (p = 0.677), suggesting uniform treatment protocol across both conditions.

Figure 6: Distribution of TCA Concentration According to Diagnosis



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Interpretation

The distribution of TCA concentration was nearly equal between the melasma (50.4%) and the acne vulgaris (49.6%) patients. This indicates that similar treatment strength was used in the both diagnostic groups.

Table 11: Number of Sessions (Group Statistics)

Group Statistics					
	Diagnosis	N	Mean	Std. Deviation	Std. Error Mean
Number of Sessions	MELASMA	40	4.13	.723	.114
	ACNE VULGARIS	40	4.75	.776	.123

Interpretation

Mean number of sessions was higher in acne vulgaris patients (4.75 ± 0.78) compared to melasma patients (4.13 ± 0.72), indicating increased treatment requirement in acne.

Table 12: Number of Sessions (Independent Samples T-Test)

Independent Samples Test								
	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-taile	Mean Diffe	Std. Error	95% Confidence Interval of

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						d)	renc e	Diffe renc e	the Difference	
									Low er	Upp er
Numbe r of Session s	Equal variances assumed	1.38 5	.243	- 3. 7 2 7	7 8	.000	-.62 5	.168	-.95 9	-.29 1
	Equal variances not assumed			- 3. 7 2 7	7 7. 6 0 6	.000	-.62 5	.168	-.95 9	-.29 1

Interpretation

The statistically significant difference was observed in number of sessions between groups ($p < 0.001$), with acne vulgaris patients requiring significantly more sessions than the melasma patients.

Figure 7: Distribution of Number of Sessions According to Duration of Disease

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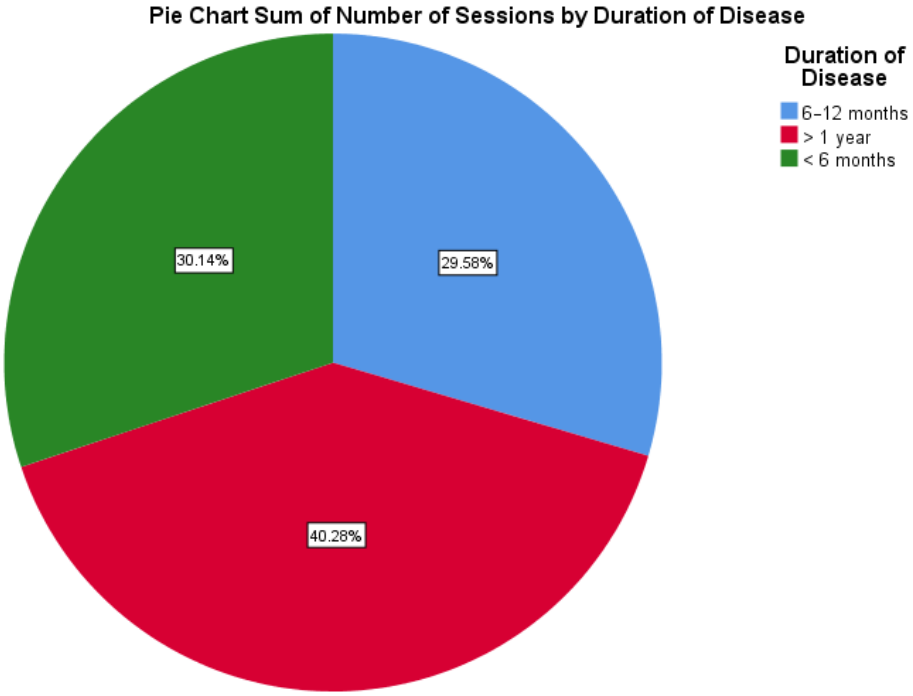

Interpretation

Highest proportion of the treatment sessions was observed in the patients with the disease duration >1 year (40.28%), followed by <6 months and 6–12 months groups. This indicates that longer disease duration is associated with the increased treatment sessions.

DISCUSSION

One of the studies that were conducted previously showed that trichloroacoustic acid (TCA) peel is very effective in treating melasma, and it can achieve a great pigment reduction and clinical outcome. The reported study had increased improvement in a substantial number of patients and further with the increase of concentrations and controlled application methods. These results are in line with the current study in which the clinical improvement rate was significantly higher in melasma patients than acne vulgaris patients. A high percentage of melasma cases were improved

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by more than 75%, showing the high response of TCA to pigmentation disorders. Such high effectiveness could be explained by exfoliative effect of TCA on epidermal melanin. Moreover, the level of patient satisfaction was also significantly increased in the melasma cases, which strengthens its clinical utility. The results indicate strongly that TCA is an effective modality that can be used in the management of melasma [1].

The other study assessing the safety and efficacy of TCA in treatment of melasma indicated that the procedure is effective and well-tolerated and has few side effects. The analysis showed that there was a steady improvement in various populations of patients and that the safety profile of TCA could be improved in case of proper usage. These results closely match with the current study, in which patients of melasma were having lesser side effects than acne vulgaris patients. The fact that TCA is tolerable in pigmentary condition is further supported by the lower complication rate in melasma. Further, efficacy and safety of the treatment are indicated by high levels of patient satisfaction in cases of melasma. The fact that the two studies are consistent gives more strength to the evidence that TCA peel is a valid option of treatment of melasma. Comprehensively, TCA seems to offer an acceptable ratio of efficacy and safety in the treatment of melasma [2].

A comparative study that has assessed combination chemical peels alongside TCA has indicated an increase in clinical outcome in patients with melasma, and the quality of pigmentation and skin texture is improved. It was also highlighted in the study that even in combination therapies, TCA is important in the attainment of substantial improvement. These results can be compared to the current research, where melasma patients had better clinical results than acnes patients. A combination therapy can improve the outcomes, however, the findings reported nowadays are enough to state that the TCA alone can be regarded as effective enough to achieve significant improvement in melasma. This observation is facilitated by the high percentage of patients who attained more than 75% improvement. On top of this, the level of patient satisfaction was high and this is another evidence of successful treatment. All these similarities indicate that TCA is still a stalwart in the melasma treatment guidelines [3].

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The comparison of TCA with other peeling agents on acne vulgaris showed moderate clinical improvement but the occurrence of side effects was high. The paper has suggested that TCA is effective in treating acne but its effect is relatively less effective than treating pigmentary disorders. These are consistent with those in the current study in which only a moderate improvement (25-50) was mostly observed among the acne patients. Moreover, the number of side effects was more common in the cases of acne, which is in line with the results of the previous studies. These may be due to the inflammatory and hyperirritable properties of acne on skin. Moreover, the level of patient satisfaction was worse in the patients with acne, as it indicates the minimal improvement and increased rates of complications. These results indicate that TCA is not that good in acne as in melasma [4].

7.1: CONCLUSION

The current research has shown that trichloroacetic acid (TCA) peel has proven to be a therapeutic intervention that can be used to treat both acne vulgaris and melasma, nevertheless, it is effective and tolerable in the two diseases. The result shows that TCA peel is a more preferable choice to use in pigmentary disorders rather than acne vulgaris due to its higher clinical benefit on melasma. The effectiveness and safety of the treatment were seen in the group of Melasma patients as the levels of satisfaction were high and no side effects were observed.

However, in comparison, patients with acne vulgaris also had a relatively low improvement, increased side effects, and more treatment sessions, which means that TCA is not as beneficial in inflammation. This was not affected by the severity at the baseline meaning that TCA peel does not react to the severity level, indicating that TCA peel can be used irrespective of the severity level. There was also similarity in the therapeutic approach as both groups had similar strength of treatment.

In general, TCA peel is regarded as a safe, efficient, and well-tolerated intervention in the treatment of melasma, but its implementation in the treatment of acnes vulgaris is rather

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mediocre and requires caution since the side effects are greater and the treatment process is more complicated.

7.2: RECOMMENDATIONS

1. TCA peel can be viewed as a first line treatment of melasma because it is more effective and more satisfactory to the patient.
2. The TCA peel has been found to have more side effects and therefore care should be taken when selecting patients with acne vulgaris.
3. The reduced doses and slow escalation guidelines are to be embraced to reduce the complications particularly in acnes patients.
4. The combination therapies (e.g., TCA with topical agents) can be employed to increase treatment outcomes, especially in melasma.
5. Before starting treatment, enough information on patient counseling on anticipated results and potential side effects should be provided.
6. Emphasizing other strict post-procedure practices such as sun protection should be the focus of improving the outcomes and preventing complications.
7. More studies, large-scale and multicenter are suggested to be able to validate the results and generalize them

7.3: LIMITATIONS

1. This study was done on a fairly small sample that can be a limitation to generalization.
2. The time of the study was short, which did not allow evaluating long-term outcomes.
3. Randomization may not be done in a random way.
4. The evaluation of the improvement and satisfaction might be subjective and create observer bias.
5. Lack of long-term follow-up restricts recurrence rates.
6. There was also the use of only certain levels of TCA which could not be compared with other levels.

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7. There were no controls on external factors like patient compliance and exposure to the environment

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