Efficacy of 15% Trichloroacetic Acid and 50% Glycolic Acid Peel in the Treatment of Frictional Melanosis: A Comparative Study

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ABSTRACT

Background: Frictional dermal melanosis is aesthetically displeasing. Various modalities ranging from depigmenting agents to lasers have been tried but it continues to be a difficult problem to treat. **Objective:** To study and compare the efficacy of 15% trichloroacetic acid (TCA) and 50% glycolic acid in the treatment of frictional melanosis of the forearm. **Materials and Methods:** 40 patients of frictional melanosis of the forearm were included in the study. Patients were randomly divided into two equal groups A and B. Pre-peel priming was carried out with 12% glycolic acid and sunscreen for 2 weeks. Group A was treated with trichloroacetic acid (TCA-15%) peel and Group B with glycolic acid (GA-50%) peel. Four peels were done one every 15 days. Clinical photographs were taken to assess the response. Response to therapy was evaluated by both objective and subjective methods. The patients were followed up for 3 months after the last peel to note any relapse. **Results:** Both TCA and glycolic acid peels were effective in frictional melanosis. TCA showed better response compared to glycolic acid at the end of the treatment, both by subjective and objective methods. However, this difference was not statistically significant ($P > 0.05$). No permanent side effects were seen in any of the treated patients and the improvement was sustained without any relapse at 3 months. **Conclusion:** Chemical peeling with both tricholoroacetic acid (15%) and glycolic acid (50%) is safe and effective for the treatment of frictional dermal melanosis. Tricholoroacetic acid was found to be marginally superior to glycolic acid.

KEYWORDS: Chemical peeling, frictional melanosis, glycolic acid (GA), trichloroacetic acid (TCA)

REC Review:

Risk	: 3.0	0 = maximum risk,	5 = least risk
Efficacy	: 3.0	0 = minimum efficacy,	5 = maximum efficacy
Cost	: 4.0	0 = very expensive,	5 = least expensive

INTRODUCTION

Frictional dermal melanosis, also known as Lifa disease, is a common dermatological problem causing great cosmetic disfigurement.[1] It is more commonly found in females. It is characterised by hyperpigmentation over bony prominences, secondary to the friction associated during bathing.[2]

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Frictional dermal melanosis like any other dermal melanosis is very difficult to treat. Various modalities like Q-Switched lasers, dermabrasion and cryosurgery have been tried, but they have not been satisfactory. Chances of developing complications like hyper and hypopigmentaion and permanent scarring are also more with these procedures.[3]

Chemical peeling is a popular, relatively inexpensive, and generally safe method for the treatment of cutaneous pigmentation. Chemical peels are used to create an injury at a specific skin depth with the goal of stimulating new skin growth and improving surface, texture and appearance. The exfoliative effect of chemical peels stimulates new epidermal growth and collagen with more evenly distributed melanin thus improving dermal melanosis.[4]

There is a wide array of peeling agents available in the market today, with different formulations and combinations. Those most commonly used include

alpha hydroxyacids (AHAs), beta hydroxyacids and trichloroacetic acid (TCA). Chemical peels are very effective for treating epidermal pigmentation like melasma, solar lentigines and post-inflammatory hyperpigmentation.[5] Chemical peels have been tried for dermal pigmentation but the results are not very satisfactory. In a study by Sharquie *et al*., a chemical peeling agent lactic acid has been found effective in frictional melanosis.[6] However, till now there have been no studies to determine the efficacy of other peels in this condition. Hence, this open randomised pilot study was undertaken to establish the efficacy of two most commonly used peels — TCA and glycolic acid (GA) — in frictional melanosis. Additionally this study also aims to compare the efficacy of these two peels.

MATERIALS AND METHODS

Forty patients attending the Dermatology outpatient department, with typical frictional dermal melanosis, clinically seen as pigmentary changes over the extensor aspect of the hands, and had not received any systemic or topical treatment in the last 6 months were included in the study. Patients with frictional melanosis in the other areas like back and clavicle were not included for the ease of comparison of the two agents.

Patients with a history of taking oral contraceptive pills, isotretinoin, pregnancy, lactation, history of keloids or hypertrophic scars, active dermatitis at the site, concomitant systemic or skin disease and those with unrealistic expectations were excluded from the study. A complete history of the patient with regard to the age, sex, onset of the disease, total duration, and any previous treatment for the disease was taken. Careful physical examination was carried out. An informed consent was taken from each patient before the start of the therapy.

A biopsy was not done on any patient as most patients were unwilling to undergo an invasive procedure since they considered the condition as a simple cosmetic concern.

Patients selected were randomly allocated into two groups: Group A and Group B. Pre-peel priming was carried out in both groups with 12% glycolic acid cream and sunscreen for 2 weeks before the peel.

Group A was treated with trichloroacetic acid (TCA, 15%) and Group B with glycolic acid (GA 50%). Before application of the peeling agent, the involved area was degreased with 70% alcohol. TCA 15% and GA 50% were applied over the lesion carefully with cotton buds. After a contact period of 3-5 minutes, neutralisation was done with cold water. If the patient developed erythema in case of GA peel and frosting in case of TCA peel, it was neutralised immediately even before 3 minutes. Post peel topical sunscreens and emollients were advised. All patients were instructed to avoid rubbing of the skin. Four peels were carried out at serial intervals of 2 weeks each. After the completion of the fourth peel, patients were advised to continue strict sun protection and topical 12% GA at night.

Colour photographs were taken of all patients at baseline and 30 days after the last peel.

All the treated patients were evaluated objectively and subjectively regarding their response to the treatment.

The objective assessment was done by using the colour score (darkness score). The darkness of the hyperpigmentation was assessed according to a special colour score chart that was invented by Sharquie *et al*.[7] According to this score, the darkness or the colour of pigmentation graded from 0 to 4 as follows:
Score 0: Similar to the surrounding skin colour
Score 1: Light brown
Score 2: Brown
Score 3: Dark brown
Score 4: Black

Subjective improvement, i.e., patient satisfaction was graded as:
Grade 0: Not satisfied
Grade 1: Moderately satisfied
Grade 2: Greatly but not fully satisfied
Grade 3: Fully satisfied[6]

Patients were evaluated every month for a period of 3 months after the last peel to detect any side effects and relapse. The data obtained were statistically analysed using SPSS software.

RESULTS

A total of 40 patients, with 34 females and 6 males were included in the study. The age at presentation ranged from 15 to 60 years with a mean age of 30.7 years. The disease duration varied between 3 months to 10 years with a mean of 3 years. In four patients, other areas like back were also involved. All the patients wanted treatment purely for cosmetic reasons. No history of any associated skin and systemic diseases was given by any patient. Nine (22.5%) patients gave a family history of similar skin pigmentation.

All patients showed improvement with regard to hyperpigmentation and overall appearance.

Objective assessment

At the end of four peels, 6 out of 20 patients in Group A (15% TCA peel) improved from grade 4 to grade 1;

3 upgraded from grade 4 to grade 3; 8 from grade 3 to grade 1 and 2 from grade 3 to grade 2 [Table 1].

In Group B (50% GA peel) after four peels, 1 out of 20 patients improved from grade 4 to grade 1; 2 patients from grade 4 to grade 3; 5 patients improved from grade 4 to grade 2; 6 from grade 3 to grade 2 and 6 from grade 3 to grade 1 [Table 2].

The difference in the pre-peel levels in both the groups was not statistically significant and thus they were found to be comparable [Table 3].

Both the groups showed improvement after the peeling [Figures 1 and 2], which was evident by comparing pre peel and post peel score using Wilcoxon test and the improvement was statistically significant ($P < 0.0001$) [Table 4]. Even though there is no statistically significant ($P > 0.05$) difference in the efficacy between the two groups the mean value of TCA group is less than GA group indicating that TCA peel is better [Table 5].

Subjective assessment

In Group A (TCA 15%), six patients were fully satisfied (grade 3), nine patients were greatly but not fully satisfied (grade 2) and five patients were moderately satisfied (grade 1) [Figure 3].

Table 1: Objective assessment-TCA

	TCA			
Before treatment	After treatment			
	Grade 4 (0 patients)	Grade 3 (3 patients)	Grade 2 (3 patients)	Grade 1 (14 patients)
Grade 4 (10 patients)	0	3	1	6
Grade 3 (10 patients)	0	0	2	8

Table 2: Objective assessment-GA

	GA			
Before treatment	After treatment			
	Grade 4 (0 patients)	Grade 3 (2 patients)	Grade 2 (11 patients)	Grade 1 (7 patients)
Grade 4 (8 patients)	0	2	5	1
Grade 3 (12 patients)	0	0	6	6

Table 3: Pre-peeling scores of both groups

Peel	*N*	Mean	S.D.	*P* value
TCA	20	3.5	0.51	0.53
GA	20	3.4	0.5	

Table 4: Comparison of pre-test and post test scores in each group

Peel	Pre-test ± S.D.	Post-test ± S.D	Wilcoxon t value	*P* value
TCA	3.50±0.51	1.45±0.75	3.98	<0.001
GA	3.4±0.5	1.75±0.63	4.02	<0.001

In Group B (GA 50%), 1 patient was fully satisfied (grade 3), 13 patients were greatly but not fully satisfied (grade 2) and 6 patients were moderately satisfied (grade 1).

On comparing the subjective scores, while Group A received a higher score (higher score means more satisfaction), the difference between the two groups was not statistically significant ($P = 0.18$) [Table 6]. This means that the patients in the TCA group were more satisfied than the GA group but this difference was not statistically significant.

During the study, none of the patients had any severe or permanent side effects. There was mild to moderate burning sensation in seven patients of Group A and eight patients of Group B. Mild erythema was seen in three patients of Group A and six patients of Group B. Mild frosting was seen in 10 patients of Group A and none in Group B. Post inflammatory pigmentation

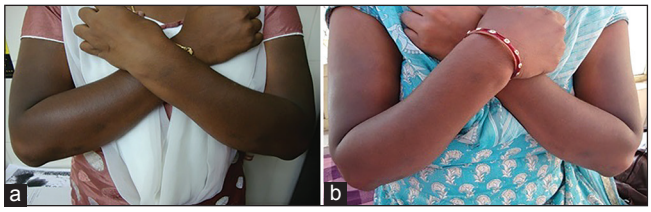

Figure 1: (a and b) Pre and post treatment photographs after TCA peeling

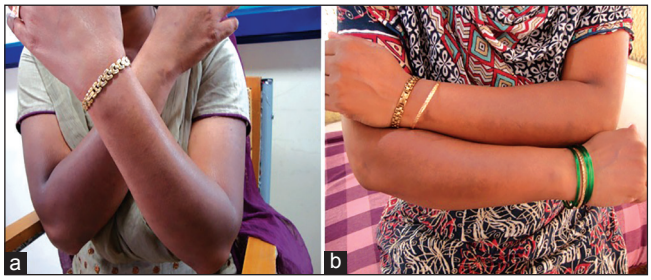

Figure 2: (a and b) Pre and post treatment photographs after GA peeling

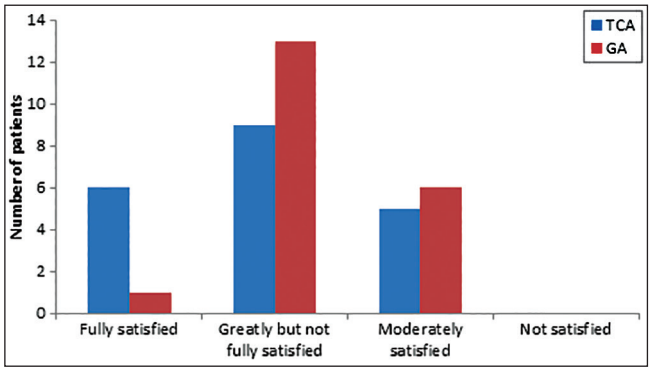

Figure 3: Subjective assessment

Table 5: Post peeling values of both groups

Peel	*N*	Mean	S.D.	*P* value	Mann-Whitney U value
TCA	20	1.45	0.75	0.09	143.5
GA	20	1.75	0.63		

Table 6: Comparison of subjective scores among the two groups

Peel	*N*	Mean	S.D.	*P* value
TCA	20	3.5	0.51	0.53
GA	20	3.4	0.5	

was seen in one patient each of Group A and Group B. Postpeel cracking was reported in nine patients of Group A but in none of the patients in Group B. It was not very troublesome for the patient and improved after applying emollient. Hypopigmentation [Figure 4] was seen in one patient in Group A and none in Group B. No allergic reaction or scarring or infection was observed in either group.

No relapse was seen in any of the patients during the 3-month follow-up period.

DISCUSSION

Frictional dermal melanosis is a dermatological problem, causing cosmetic disfigurement especially in females. It is a distinctive entity, first described by Sharquie, in 1993.[8] It is characterised by hyperpigmentation over bony prominences, secondary to the use of a rough washing agent during showering. The washing agents commonly implicated are nylon towels, sponges, cotton towels, brushes and back scratchers etc.[9] In India, coconut coir and sometimes even washing stone have been used.[10] It is more commonly seen in Japan, Middle East and Latin America.

The aetiopathogenesis of the disease is not well understood. It is speculated that the pigmentation is a response to repeated damage of the basal layer of the epidermis as a result of squeezing the epidermis between the washing brush above and the bone below. Damage to the basal cell layer and melanocytes leads to pigmentary incontinence.[8] It is clinically characterised by well-circumscribed reticulated macules. Superficial bony prominences and areas like clavicular zones, trunk (mainly over scapular areas) and the extensor aspect of the hands are most commonly affected.[11]

The histology of the disease is characterised by a striking degree of pigmentary incontinence and the presence of melanophages in the dermis. Amyloid deposition can rarely be seen.[1]

Frictional dermal melanosis is difficult to treat. Firstly, the patients should avoid rubbing the skin with nylon towels, sponges, brushes and back scratchers etc. Treatments found useful for dermal melanosis like dermabrasion or laser therapy like Q Switched ND:YAG laser have been found to be useful in frictional melanosis as well but the chances of complications like scarring and hypo and hyperpigmentation are more.[12]

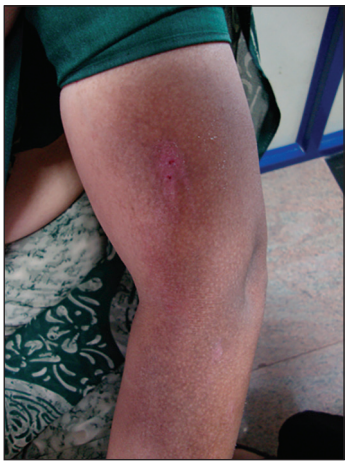

Figure 4: Hypopigmentation seen in a patient

Chemical peels have become an increasingly popular method to treat a myriad of benign skin disorders. Chemical peeling or chemical rejuvenation is a procedure where a chemical agent or combination of agents of defined strength is applied to the skin, causing a controlled destruction of the layers of the skin. This is followed by regeneration and remodelling of the skin with improvement of texture and surface abnormalities.[13]

Both the agents used in this study, TCA 15% and GA 50%, are cost effective and easily available.

Application of TCA to the skin causes precipitation of proteins and coagulative necrosis of cells in epidermis. This leads to re-epithelialisation with replacement of smoother skin with an even skin tone.

GA acts by decreasing corneocyte cohesion leading to sloughing of dead cells and stimulation of new cell growth in the basal cell layer. It increases synthesis of number of connective tissue components like collagen, elastin, glycosaminoglycans and mucopolysaccharides. In addition to this, it also decreases melanin production by direct inhibition of tyrosinase.[14]

In our study, the average age of patients at presentation was 30 years. This is comparable to the study conducted by Sharquie *et al.*[1] where the mean age was 24 years. In the study by Sharquie *et al.*,[1] frictional melanosis was more common in female, the mean duration of the disease was 2.7 years and 16% of the patients gave family

history which was comparable with our study. In our study also, it was more common in females, the mean duration of disease was 3 years and 22.5% of the patients gave family history of frictional melanosis.

A study done by Sharquie *et al*.[6] showed lactic acid peel as an effective mode of therapy in treating patients with frictional dermal melanosis. Our study was done to assess the efficacy of TCA and GA, in the treatment of frictional melanosis. To our knowledge, no other study has compared these two modalities for the treatment of frictional melanosis. Both these agents showed a good therapeutic response which was statistically very significant.

In a study by Sachdeva, [5] which compared the efficacy and side effects of TCA and GA in facial pigmentation, GA was found to be the superior peeling agent with better patient tolerance and lesser side effects compared to TCA, but the difference was not statistically significant. In our study, TCA was more efficacious than GA peel, but it was statistically not significant. Even though post peel cracking of the skin and frosting were seen only in the TCA group it did not cause any distress to the patient.

There was no relapse during the follow up period. This may be aided by the strict sun protection and continuous use of glycolic 12% cream even after the four sessions of peel were completed.

CONCLUSION

From the present study, it can be concluded that both 15% trichloroacetic acid (TCA) and 50% glycolic acid are equally effective peeling agents in the treatment of frictional melanosis of the forearm. However, the response with TCA was better than glycolic acid, though statistically not significant. Both the peels are very safe with minimal side effects and the beneficial results achieved can be maintained with topical application of sunscreen and glycolic acid 12%. One of the drawbacks of our study was the absence of histopathological workup. Further studies using glycolic and TCA peels in a larger sample size along with histopathological work up are required to substantiate the results of the present work.

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