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ORIGINAL ARTICLE

The Efficacy of Tricholoroacetic Acid 70% after Microneedling in the Treatment of Non-Segmental Vitiligo

Mohamed Hamed Khater [(1)], ***Mohamed Mahmoud Nasr*** [(1)], ***Samar Salah Ibrahim*** [(1) *]
Dermatology, Venereology and Andrology Department, Faculty of Medicine, Zagazig University, Egypt.

***Corresponding author:**
Samar Salah Ibrahim
Dermatology, Venereology and Andrology Department, Faculty of Medicine, Zagazig University, Egypt.

E.mail: drsamar salah 342 @Gmail.com.

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ABSTRACT

Background: Vitiligo is one of the most common dermatological disorders characterized by progressive loss of the skin color due to selective destruction of melanin producing cells defined as melanocytes. Although its etiology is difficult to be exactly known, but many studies supported its autoimmune etiology by increasing evidence. Infections, genetic susceptibility, stress, and neural abnormalities also have been concerned in vitiligo development. The aim of the study is to assess the efficiency of Trichloro-Acetic Acid (TCA) 70% after skin microneedling using dermapen in the treatment of localized non segmental vitiligo. **Methods**: This current study was conducted on 34 patients of both sexes at outpatient clinic of Dermatology, Venereology and Andrology Department at Zagazig University during the period from January 2018 to July 2018. A written informed consent was taken from each patient after explaining to them the details about the nature of study and after obtaining approval from Institutional Review Board (IRB).IRB approval number is (4587).The patients received 4 sessions of microneedling followed by TCA 70% at 2 weeks interval. **Results**: Evaluation of repigmentation by the qualitative method showed that the improvement was good to excellent (repigmentation >50%) in 53% of patients, the improvement was moderate (26-50%) in 14.8% of patients, there was no effect in 8.2% of patients. **Conclusions**: Microneedling plus TCA 70% is considered a simple method to improve vitiligo with cosmetically satisfactory repigmentation and a quite innocent alternative or additive method that can be used with any of the recognized and commonly approved treatment therapies of localized, non-segmental stable vitiligo.

Keywords; Vitiligo, Microneedling, TCA.

INTRODUCTION

Vitiligo is a specific type of idiopathic acquired or inherited leukoderma characterized by scattered well-confined white cutaneous patches devoid of recognizable efficient melanocytes caused by numerous pathogenic mechanisms **[1]**. There are 3 types of vitiligo; segmental vitiligo, non-segmental vitiligo, and unclassified vitiligo. According to the site of vitiligo, vitiligo may be mucosal, acrofacial, mixed, and generalized subtypes **[2]**.

Although the lesions can appear anywhere, vitiligo usually affects the neck, face and areas liable to frequent trauma, particularly bony prominences of the feet, hands and forearms **[3]**. The treatment of vitiligo includes topical agents, systemic corticosteroid, phototherapy, and surgery **[4]**.

The using of the dermapen in skin microneedling was found to be more appropriate than the dermaroller. In hairy areas, trichloroacetic acid (TCA) induce chemical trauma that results in perifollicular pigmentation and also it induces perilesional repigmentation [**5**].

METHODS

The current study was carried out on 34 patients of both sexes at outpatient clinic of Dermatology, Venereology and Andrology Department at Zagazig University during the period from January 2018 to July 2018. An informed written consent was taken from each patient after explaining to them the details about the nature of study and after obtaining approval from Institutional Review Board (IRB). IRB approval number is (4587). The study was done according to the code of Ethics of The World Medical Association (Declaration of Helsinki) for studies involving humans.

The age of that group ranged from 22 to 62 years. Inclusion criteria: Patients more than 12 years old, patients from both sex and patients with non-

segmental stable vitiligo for at least 6 months. Exclusion criteria: Patients with keloidal tendency, patients with bleeding tendency, and patients receiving topical or systemic treatment for vitiligo for less than 6 months.

All patients were subjected to:

Full history taking personal history including name, sex, age, occupation, marital status, residence, and habits of clinical importance. Present history: Onset and course, site of the lesion, duration of present lesion**.** Past history: Number of previous lesions of vitiligo if present, age of onset of vitiligo, disease duration. Family History: Family history of vitiligo.

Clinical assessment: To determine the extent of lesions and to exclude any associated systemic or dermatological autoimmune disease such as psoriasis and lupus erythematosus. Procedure**:** Anesthetic cream (Lidocaine 25%) was applied topically under occlusion for 30 minutes. Alcohol 70% was used to clean and sterilize the targeted areas after application of Lidocaine 25%. Then the dermapen (Brand Name: Dr Pen) was used to induce physical injury that resulted in skin microneedling, it was used at the lowest speed and the depth of the needle penetration was at 1 - 2 mm according to the skin thickness, this was done in the area of vitiligo and about 2 mm rim surrounding. It was done in uniform vertical and horizontal directions, till the appearance of multiple punctuate bleeding points. Then TCA 70% was gently applied using smooth gauze which was rolled on the tip of applicator to ensure an accurate application till the appearance of an ivory white uniform frosting. Lastly, topical antibiotic cream was applied. Patients were recommended to use a skin moisturizing cream twice daily and not to remove the peeled crustations. This was done every 2 weeks for 2 months.

Evaluation of the treatment: It was done by: Photographs: photographs were taken at baseline and before each session (cannon camera with 18 mega pixel). Clinical examination: The patients were examined in the first visit and were reviewed every two weeks for progress therapy and the presence of any side effects. Evaluation of repigmentation: Evaluation of repigmentation was done according to: Qualitative method using Physician's Global Assessment (PGA) Scale as the following: If there was no change the score was 0, if the improvement was (0-25%) the score was mild, if the improvement was (26-50%) the score was moderate, if the improvement was (51-75%) the score was good and if the improvement was (> 75%) the score was excellent, the evaluation depends on the human eye to get the scoring. Furthermore, PGA score is also subjective, as there are intra and inter observer variations **[6]**. Patients satisfaction: The degree of improvement according to the patient opinion, the patients were asked at the final visit about the overall satisfaction according to whether the patient was not satisfied, slightly satisfied, satisfied or very satisfied.

Follow up assessment: The patients were followed up monthly for 3 months after the end of the treatment sessions to detect any recurrence, complications or worsening of the lesions.

STATISTICAL ANALYSIS

At the end of the study, all data were checked, entered and analyzed by using special package for social science (SPSS) version 20. Data were expressed as mean ± standard deviation for quantitative continuous variables, and number and percentage for categorical variable using chi square (X^2).

RESULTS

The present study was carried out on 34 patients with non-segmental stable vitiligo, 14 males (41.3%) and 20 females(58.8%) with mean age 37.06 ± 11.31 (Table 1), Regarding the predisposing factors, (17.6%) of patients with positive family history and (75%) of the patients have been exposed to stress (Table 2), All lesions were acrally distributed, the mean ± SD of the duration of the disease was 5.25 ± 3.62 with median (range):4.5 (1 - 13) (Table 3). By the end of the therapy the evaluation of repigmentation was done according to PGA scale and 53% of response (repigmentation 26-50%) (Table 4). Regarding the patient`s satisfaction, 41.1% of patients were very satisfied, 38.2% were satisfied and 20.5% of patients were not satisfied (Table 5). Regarding the side effects of our study; the reported side effects were minor there were no side effects in 56.2% of patients. Infection occurred in 18.7% of patients which completely healed after application of topical antibiotic 25% of patients complained of burning sensation. No patients complained of any systemic side effects. The patients were followed up for 3 months from the last session and there was neither recurrence nor appearance of new lesions during the period of our follow up.

Table (1): Demographic data

Variable		(22-62 Y) (n=34)
Age (years) Mean ± SD		37.06 ± 11.31
Sex	Male	14 (41.3%)
	Female	20(58.8%)

Table (2): Predisposing factors

		(n=34)
Family history	Positive	6 (17.6%)
	Negative	28 (82.3%)
Exposure to stress		12 (75%)

Table (3): The baseline characteristics of the studied patients:

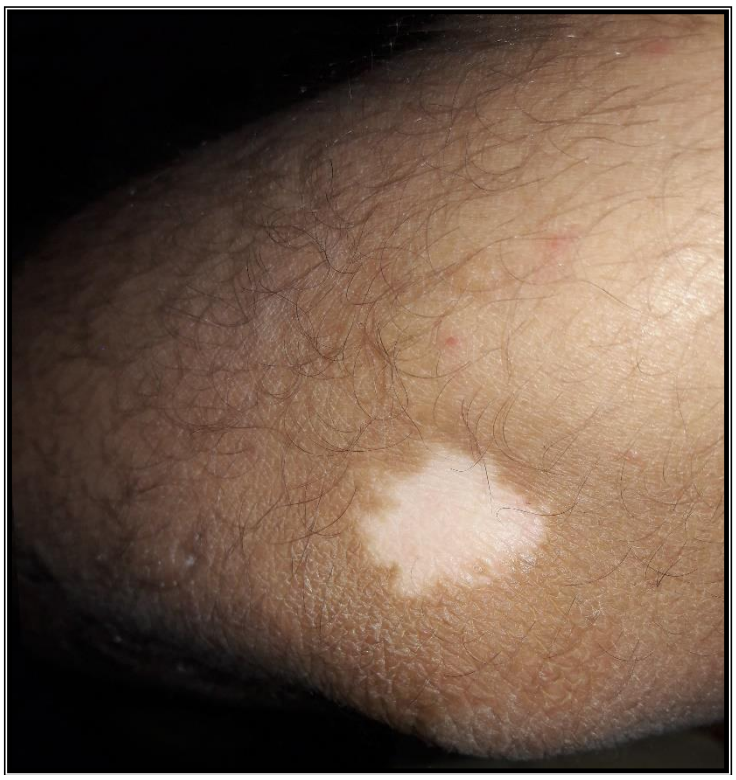
Site	Number of patients	Duration Years
Shoulder	2 (5.8%)	Mean ± SD: 5.25 ± 3.62 Median (range): 4.5 (1 - 13)
Forearm	4 (12.5%)	
Elbow	5 (14.8%)	
Hands	8 (23.5%)	
Knee	3 (8.8%)	
Thigh	1 (2.9%)	
Leg	5 (14.7%)	
Foot	6(17.6%)	

Table (4): Qualitative assessment of repigmentation:

	(n=34)
No effect	3 (8.2%)
Mild	8 (23.5%)
Moderate	5 (14.8%)
Good	13 (38.3%)
Excellent	5 (14.7%)

Table (5): Patient`s satisfaction:

	(n=34)
Not satisfied	7 (20.5%)
Satisfied	13 (38.2%)
Very satisfied	14 (41.1%)



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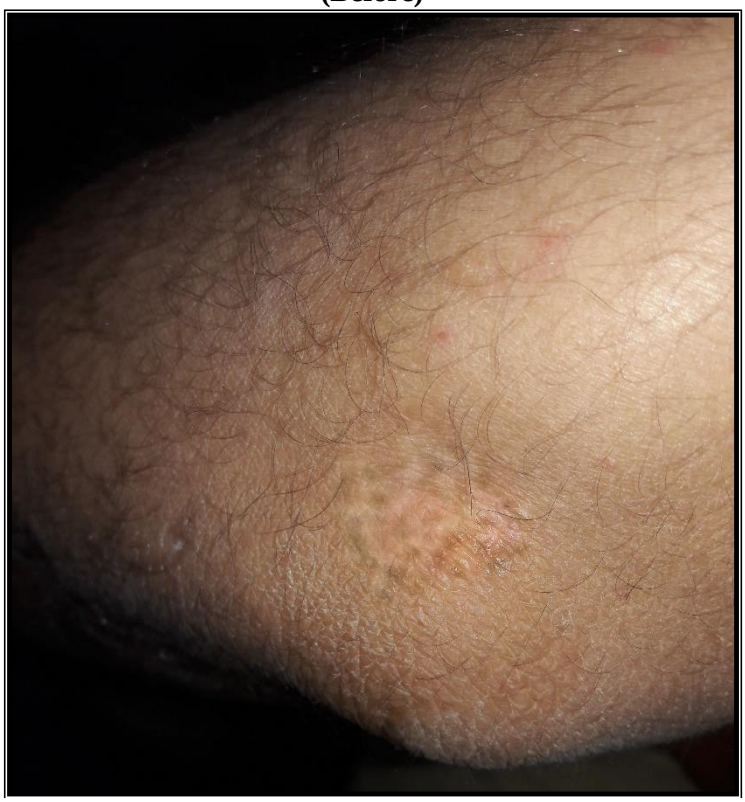
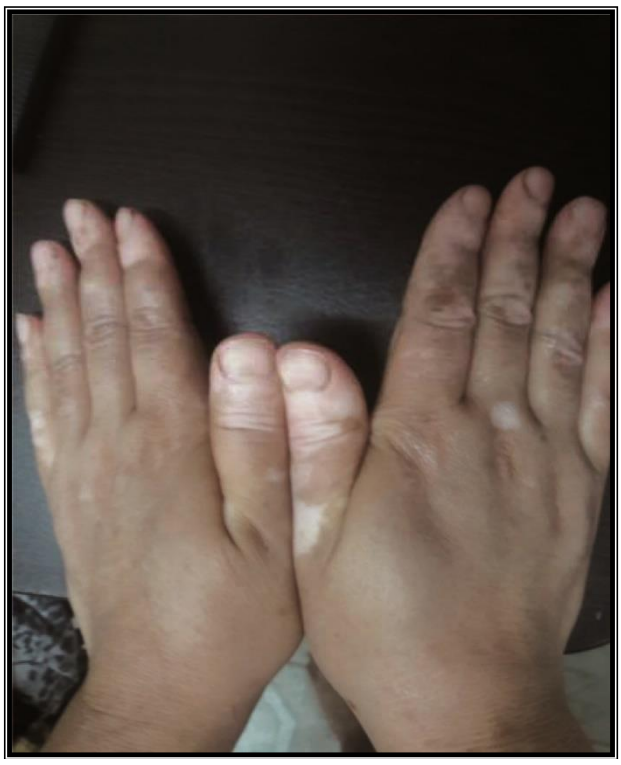


(After the fourth session)

Figure1: male patient 28 years with vitiligo localized to the left elbow before and after treatment with microneedling plus TCA 70% showed excellent improvement (repigmentation 90%).



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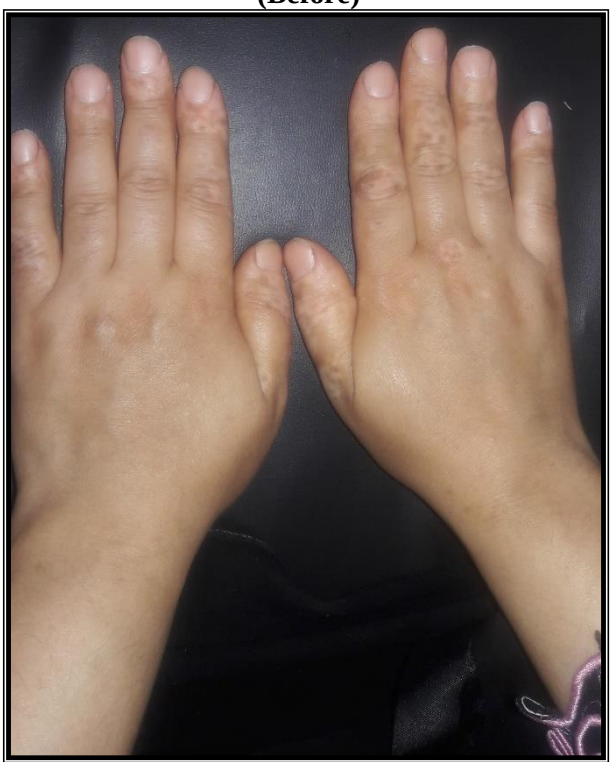

(After the fourth session)

Figure 2: Female patient 35 years old with vitiligo in both hands before and after treatment with microneedling plus TCA 70% showed good improvement (repigmentation 60%).

DISCUSSION

Vitiligo is one of the most common dermatological disorders characterized by patchy loss of the skin color due to selective damage of melanin producing cells defined as melanocytes. Its etiology is not well known **[7]**.

Vitiligo may be caused by many factors like stress to the melanocytes which produce the melanin which gives the skin its color. Some triggers like sunburn, chemical exposures and mechanical trauma may induce an autoimmune response that damage melanocytes causing progressive loss of

the skin color **[8]**.

The treatment of vitiligo is often a hard challenge and involves many therapies **[9].** It usually needs 2 steps; the first step involves providing stability and preventing the progression of active disease. The second step involves repigmentation of the vitiliginous area **[9].**

It was found that combined treatments enhance the effectiveness and shortens the time needed to gain repigmentation with minimal side effects; this strategy has been used in patients with lesions refractory to monotherapies **[10]**.

This study was done to detect the role of microneedling plus TCA in the treatment of localized non segmental stable vitiligo, 34 vitiligo patients were included in this study, all lesions were acrally distributed. The mean age was 37.06, this agrees with Gaafar, [11] who revealed that this is the peak age of the persons with vitiligo keeping with earlier studies documenting that vitiligo was more common below the age of 40 years. Regarding the predisposing factors, the current study showed that only 17.6% of patients included in the study had positive family history, this is in agreement with Hayder et al, [12] study which revealed that family history was negative and did not reach statistical significance.

Sharquie et al,[13] found that 40% of patients included in his study had positive family history. This may be due to the large number of cases included in his study which was 1000 patients.

As regard exposure to stress our study showed that 75 % of patients had positive history for exposure to stress, this in agreement with Papadopoulos et al, [14] who found that many patients included in their studies had some variable stressful conditions including illnesses, financial or marital problems, and changes in sleeping or eating habits. Also, in a study done by Silvan, [15] 40% of included patients suffered from death of a family member or a close friend.

Evaluation of repigmentation by the qualitative method showed that the improvement was good to excellent (repigmentation >50%) in 53% of patients, the improvement was moderate (26-50%) in 14.8% of patients, there was no effect in 8.2% of patients.

Regarding the patient`s satisfaction, 41.1% of patients treated with microneedling plus TCA 70% were very satisfied,

Several studies were done to clarify the role of microneedling in the treatment of localized non segmental vitiligo, but to our knowledge, our study is the first one to inform that using microneedling followed by TCA 70% as a way of increasing the response rate and shortening the duration of treatment in vitiligo.

Ahmed et al,[16] used needling in association with Narrow Band Ultraviolet-B (NBUVB) therapy in localized non segmental vitiligo and found that patients showed good response. Both needling and NBUVB were done 3 times per week for 24 weeks. The study confirmed that repigmentation of vitiliginous patches with microneedling resulted mainly from the melanocytes which are dragged by the tip of the microneedles from the pigmented margins of the white patch or from groups of pigment which present inside the patch, this agreed with our study, as the melanocytes could be physically pushed to the depigmented center from the pigmented margins of the patch with the dermapen device.

In our study, 53% of patients showed good to excellent response (repigmentation >50%) with microneedling combined with TCA 70%, this was more faster than Farajzadeh et al, [17] who used pimecrolimus (1%) cream in association with microdermabrasion (10 sessions) and found that near 25% of the white patches started repigmentation after 4 weeks from the last session of the treatment. We explained this by the fact that dermapen device produced skin pores which are vertical and can penetrate up to 0.5 mm in to the mid - dermis causing small defects in the epidermis that help in the delivery of TCA to the melanocytes which are present in the stratum basalis, while microdermabrasion resulted in removing only the horny layer of the epidermis and this results in difficulty to deliver the topical drug to the melanocytes, so the number of sessions must be increased [18] .

Stanimirovic et al,[19] use NBUVB and topical latanoprost solution 0.005% with and without microneedling in patients with bilateral symmetrical resistant vitiligo, 17 patients in each group showed repigmentation in only 37.8% of the treated lesion and only 8.8% of the treated lesions showed good to excellent improvement. But in our study the application of TCA 70% after microneedling resulted in improving the outcome rate (53% repigmentation >50%).

El-Mofty et al, [20] reported that there was significant increase in interleukin 17 level after the fourth session of the dermapen microneedling and it is considered as a warning sign to the probability of developing new lesions through the process which is called koebnerization caused by the microneedling device trauma. Accordingly, it is not a suggested as a method of vitiligo treatment. However, in our study the patients were carefully selected and any patient with history of koebnerization was excluded from the study and the usage of TCA 70% after microneedling accelerated the rate of repigmentation within few

sessions (4 sessions).

The study done by El-Mofty et al, [20] clarified the role of TCA in induction of repigmentation in vitiligo when they used narrow band UVB with and without application of TCA 25% on vitiliginous areas before the NBUVB and they found that the earlier response to NBUVB was achieved when NBUVB was done in after application TCA, also in our study TCA after microneedling resulted in improving response rate.

Also, De Padova and Tosti, [21] used TCA 35% in the treatment of acne scars and photo-aging and found that TCA peeling enhanced melanogenesis and skin pigmentation.

Puri and Puri, [22] applied TCA 100% (repeated once a month if required). They reported marked pigmentation in 66% of patients and mild pigmentation in 20% of them.

In contrast to our study regarding the concentration of TCA as we used TCA 70%, while Hunter et al, [23] used lower concentration (15% and 25%) and their explanation was that higher concentrations of TCA may induce an estimated damaging inflammatory reaction as it resulted in hot spots so it can penetrate deeper for no obvious reason, but in our study the reported side effects from TCA 70% were minimal and all patients tolerated the procedure well. With regard to body sites, there was excellent improvement in our patients with vitiligo in the acral parts, Ibrahim et al., 2018, revealed that the acral parts showed good response with tacrolimus combined with microneedling as 50% of the acral patches achieved moderate improvement (repigmentation 25% - 50%), and 1 patch achieved good improvement (repigmentation >50%).

Mohamed et al., 2015, used CO2 laser skin ablation followed by 5-fluorouracil application for acral vitiligo for a maximum period of 5 months. Almost half (49.8%) of the lesions achieved marked repigmentation. However, in contrast to the above method, which is time consuming and expensive, our study showed more cost-effective results and less painful than CO2 laser ablation technique. Regarding the side effects of our study; the reported side effects were minor and there were no side effects in 56.2% of patients. Infection occurred in 18.7% of patients which completely healed after application of topical antibiotic. 25% of patients complained of burning sensation. No patients complained of any systemic side effects.

The patients were followed up for 3 months from the last session and there was neither recurrence nor appearance of new lesions during the period of our follow up.

This may indicate that the combination of TCA with microneedling could be considered as safe and tolerable technique for treatment of vitiligo. To the best of our knowledge, we demonstrated that, the efficacy of using therapeutic trauma in the form of microneedling followed by TCA 70% in the treatment of non-segmental vitiligo is safe and not time consuming and is considered as reproducible method of repigmentation in vitiligo not responding to the ordinary medical treatment.

CONCLUSIONS

Microneedling plus TCA 70% is considered a simple method to enhance vitiligo treatment with cosmetically satisfactory repigmentation and a quite innocent alternative or additive method that can be used with any of the recognized and commonly approved treatment therapies of localized, non-segmental stable vitiligo.

Conflict of interest

The authors declare no conflict of interests.

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