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# The efficacy of microneedling (dermapen) combined with latanoprost 0.005% solution versus dermapen with tacrolimus 0.03% ointment in the treatment of acrofacial vitiligo

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**Abstract**

Vitiligo is an acquired autoimmune skin depigmenting disorder, which can affect skin, hair, eyes, and mucous membrane due to selective destruction of functioning epidermal melanocytes. Surgical and nonsurgical approaches have been used to treat vitiligo. However, not all individuals respond to a single treatment for vitiligo to assess the efficacy and safety of dermapen with tacrolimus ointment versus dermapen with latanoprost solution. This research was performed on 30 patients with bilateral, symmetrical, acrofacial vitiligo. Patients' lesions were divided into two categories.: group I: microneedling with topical Ioprost eye drops solution (latanoprost 0,005% solution) was applied to one side of the patient's face, group II: lesions of the other side of patient's face were treated with topical tacrolimus 0.03% ointment. This procedure was repeated every 2 weeks for 3 months (six sessions). After the last session, the patients were observed for three months. At 12 weeks, the VASI and vitiligo surface area demonstrated statistically significant variations among the two groups. There was a statistically significant rise in the evaluation of repgimentation in the tacrolimus group compared to the latanoprost group , in addition to a very statistically significant increase in the pattern of diffuse regimentation ($p = 0.005$). In comparison to the latanoprost group, the tacrolimus group's proportion of patients reporting burning and itching was statistically substantially higher ($p< 0.001$). The results demonstrated the superiority of microneedling paired with tacrolimus for the treatment of acrofacial vitiligo.

**Keywords:** Vitiligo, microneedling, latanoprost, tacrolimus

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## 1. Introduction

Depigmented macules and patches on the skin, hair, and mucosal surfaces are characteristic of vitiligo, an autoimmune illness characterised by the loss of melanin pigmentation. [1]. Around 0.5–2percent of the world's population is affected. [2]. Visible skin conditions might inhibit healthy psychosocial growth. Traditionally, there has been a stigma linked to skin illnesses and those affected by them. [3]. Frequently, vitiligo patients have several psychological issues, which can lead to low self-esteem and social isolation. Clinical involvement in vitiligo might have a segmental or non-segmental shape. Classifying the condition of a disease is based on its progression or stability. Furthermore, participation might be minimal (in the case of a localized disease) or widespread (generalized disease) [4]. Most cases of vitiligo are treated with a combination of two methods. The first is to stop the spread of the disease (to give stability) .The second approach is attempting to repigment the bare skin. Preventing relapse and keeping the disease in remission are also crucial. [5]. Treatment of vitiligo is a challenge for dermatologists. Therapeutic options include topical therapies such as topical corticosteroids [6]. topical calcineurin inhibitors (TCIs) [7]. topical prostaglandin analogs [8]. topical Calcipotriol [9]. and topical methotrexate [10]. Systemic treatment such as systemic corticosteroids [7]. Minocycline [11]. systemic Methotrexate [12]. Systemic antioxidants [13]. Oral statins, Oral Janus kinase (JAK) inhibitor medications (ruxolitinib and tofacitinib) [14]. Physical Treatment such as Phototherapy [15]. Photochemotherapy (PUVA) [16]. Excimer LASER [17]. Carbon dioxide ($CO_2$) fractional LASER [18]. Combined therapy [19]. Surgical treatment [20]. Depigmentation in individuals who have severe vitiligo (> 50% body surface). [19]. Camouflaging Agents [21]. Proactive therapy to avoid recurrences [22].

Microneedling, Latanoprost solution and tacrolimus ointment are used alone or with other therapy in patients with vitiligo.

Microneedling is a minimally invasive technique that induces a controlled skin injury without causing true epidermal damage. Microneedling improves the transport of many medications,bypasses the stratum corneum deposits the drug directly into the vascularized dermis, accelerates healing and reduces infection and scarring risks. It is used by itself or in conjunction with other treatments to treat vitiligo.The epidermal inflammatory response results in a rise in the synthesis of melanin and transfer to adjacent keratinocytes, whereas pigmentary incontinence causes melanophages to accumulate in the upper dermis following injury [23]. cause reverse Koebner response. Latanoprost 0.005% solution is a prostaglandin F2alpha analogue used in managing glaucoma. Latanoprost 0.005% solution leads to restore skin pigmentation in patients with vitiligo by upregulating tyrosinase and promotes melanocyte proliferation [24]. Calcineurine inhibitors, such as tacrolimus 0.03% ointment inhibits calcineurin action, This inhibits T-cell activation and the release of inflammatory cytokines.. It can be used to restore skin pigmentation [25].
This research aims to examine the effectiveness and safety of dermapen combined with latanoprost solution and dermapen combined with tacrolimus ointment in treating acrofacial vitiligo.

## 2. PATIENTS AND METHODS

This prospective, random, comparative study was performed on thirty Egyptians with acrofacial vitiligo.All patients were recruited from the Dermatology Out- Patient clinic of Alzhraa University Hospital. Risks, benefits and potential complications were discussed with patients and written consent were obtained from all patients. This study was carried out in the period from June 2019 to April 2020.
Patients with the following criteria were enrolled in the study: bilateral, symmetrical, stable acrofacial vitiligo for the last six months, those who stop vitiligo treatments since 3months, patients above 18 years old and both sexes. While patients with other forms of vitiligo, pregnant and lactating females with vitiligo, concomitant autoimmune diseases associated with vitiligo such as diabetes mellitus, autoimmune thyroid, Addison's disease, alopecia areata, autoimmune pernicious anaemia or others, past history of bacterial and viral skin infections, history of scar and keloid formation, bleeding disorders or on any anticoagulant therapy like warfarin, heparin, as it can cause uncontrolled bleeding during procedures, asthma and hypertension were excluded from the study .Each patient subjected to: Full history taking, general medical examination, complete eye examination, local dermatological examination, estimation of Vitiligo Area Scoring Index (VASI). Using the random number allocation method,One side of patient's face was treated with microneedling and topical Ioprost eye drops solution (latanoprost 0,005% solution) manufactured by Orchidia Pharmaceutical Industries in Egypt. While the other side received microneedling and topical tacrolimus 0.03% ointment manufactured by Marcyrl Pharmaceutical Industries in Egypt. The patients were treated as follows: The vitiliginous lesions were cleaned & sterilized with 70% alcohol. Each patient put the topical anesthetic cream 60 minutes under occlusion before each session. Sabapremax cream manufactured by Sabaa International pharma group in Egypt contains(lidocaine 2.5% and 2.5% Pridocaine).The cream was gently removed with a sterile piece of gauze, and the subject was positioned for the session. Then Microneedling was performed at the same number of the symmetrical vitiliginous patches of both sides of the patient's face with dermapen (My M Micro Needle Therapy, Dr.Pen,ultimata-A6,made in China) at the lowest speed and the needle penetration depth at 0.25-0.5 mm according to the thickness of the skin.While utilising corded power, the device speed may be changed among 65 & 70 Time/sec. The vitiliginous region was stroked in consistent horizontal and vertical directions. The abrasion depth was adjusted using the depth adjustor. This was followed by the emergence of many small, punctured, bleeding sites. After microneedling procedure, one drop of Ioprost (latanoprost 0.005% solution, was distributed over every 1cm² of the vitiliginous lesions of one side of the patient's face (group I) while topical tacrolimus 0.03% ointment was applied on the similar vitiliginous lesions of the other side of the patient's face (figure.3) (group II). Then the patient was advised to apply topical latanoprost drops on the same side and topical tacrolimus on the other side twice daily for two weeks. All patients underwent this operation every two weeks for a maximum of three months (six sessions). Patients were encouraged to apply topical antibiotic fusi cream (fusidic acid) made by Pharaonia Pharmaceuticals twice a day for two days following each session and to apply sunscreen regularly before sun exposure. The patients were warned that the treatment region might seem swollen, erythematous, and bruised for 2 or 3 days following the procedure. (26). The response to treatment was evaluated every month for three months and at the end of the study; assessment of repigmentation clinical pattern and the degree and extend of repigmentation were performed by two blinded dermatologists. Side effects of the treatment were recorded by participants in a diary. Participants were advised to document the severity, timing, and description of any side effects (erythema, redness, itching, burning feeling). The response to treatment was followed up by digital photographs at baseline, every month of treatment for three months and at the end of the study using camera (mobile iphone 8, 12mega pixel, made in china).

### *2.1 Statistical Analysis*

The data was collected, edited, coded, and put into version 23 of the IBM Statistical Program for the Social Sciences (SPSS). The quantitative data was reported as the mean, standard deviations, and ranges where the data was parametric, and as the median and interquartile range (IQR) when the data was non-parametric. Consequently, qualitative characteristics were reported in numerical and percentage format. Subsequently, the relevant statistical analyses were performed. The confidence interval was set to 95% and the acceptable margin of error at 5%.

## 3. RESULTS AND Discussion

Thirty patients with acrofacial vitiligo were completed this study (Table 1). They were enrolled from Al Zahraa University Hospital of the Faculty of Medicine for Girls, Al Azhar University. The patients' age varied from 18 to 70 years with mean±SD of 41.0 ± 14.41. They were 21 females (70.0percent) and 9 males (30.0percent). This

prospective, randomized research compared the efficacy of combined microneedling with topical latanoprost and combined microneedling with tacrolimus ointment in the treatment of thirty individuals with stable bilateral symmetrical acrofacial vitiligo. The lesions of the enrolled patients were separated into 2 groups; all lesions of one side of patient's face treated with combined microneedling with topical Ioprost eye drops solution (latanoprost 0,005% solution) served as group I and the same number of symmetrical lesions of the other side of patient's face treated with combined microneedling with topical tacrolimus 0.03% ointment served as group II. Each patient was subjected to the previous treatment for three months then the patients followed up three months without any treatment. The patients' age ranged from 18 to 70 years with mean ±SD 41.0 ± 14.41. They were 21 females (70.0%) & 9 males (30.0%) To the best of our knowledge, this is the 1st randomized study compared the efficacy of combined microneedling with latanoprost 0.005% solution versus combined microneedling with tacrolimus 0.03% ointment for the treatment of acrofacial vitiligo. Our results emphasis the role of the combined microneedling with topical treatment for improving the lesions of vitiligo. The results reported the highly significant improvement in VASI of the patients subjected to the combination of microneedling and tacrolimus ointment more than the patients subjected to microneedling and latanoprost solution. Based on our results; After week 4 of treatment , there was no substantial difference in VASI or vitiligo surface area among the 2 investigated groups. While at week 8; the results showed significant difference among the two studied groups according VASI & no significant difference regarding vitiligo surface area (VSA), this may be because some patients were responded to treatment with hyper pigmented rim around the vitiliginous area or with faint pigmentation that didn't reach the normal skin color, in both conditions the degree of repigmentation affect the VASI score and didn't affect vitiligo surface area /cm. The results showed significant difference among the two studied groups(I,II) regarding VASI and vitiligo surface area at week 12 and week 24 with p-value <0.001 and< 0.001 respectively.

Regarding the assessment of the regimentation between the two studied groups, showed that there was significant increase in the assessment of regimentation in tacrolimus group than latanoprost group at week 4 with p-value = 0.046, at week 8 with p-value < 0.001, at week 12 with p-value < 0.001 and at week 24 with p-value < 0.001. The VASI scores of those who had microneedling and latanoprost (group I) decreased significantly from baseline by weeks 4, 8, 12 and 24 (p-values = 0.006, <0.001,< 0.001and <0.001, respectively). Vitiligo surface area (VSA) scores decreased significantly from baseline at weeks 4, 8, 12 and 24 (p-values =< 0.001, <0.001,< 0.001 and <0.001 respectively). Kanokrungsee et al. [27]. found that the VSA significantly decreased on bimatoprost side, when compared to the baseline (P =0.008). Although Tawfik et al. [28]. used microneedling combined with 0.005% latanoprost for treating 25 patients with segmental vitiligo. They reported significant improvement in VASI score. Regarding the assessment of repigmentation in our study in microneedling combined with latanoprost (group I),At week 12, there was no repigmentation in (13.3%) of the patients, poor repigmentation (1%-25%) in (16.7%) of patients, moderate repigmentation (26–50%) in (46.7%) of patients, good repigmentation (51–75%) in (10.0%) of patients and (13.3%) with excellent repigmentation (>75%). Anbar et al. [24].found that patients with stable vitiligo who were treated with LT alone on one side were completely cured and (43%) obtained good response to complete repigmentation (>75% repigmentation). Regarding the patterns of repigmentation in our study in group I; At week 12, there was marginal repigmentation in (76.7percent) of patients, medium spotted repigmentation in (6.7%) of patients, (13.3%) of patients with erythema, diffuse type in (13.3%) of patients and with no perifollicular repigmentation. Anbar et al. [24]. reported that the mode of repigmentation of the vitiligo patients was both perifollicular and marginal.

The results of our study showed that there was significant decrease in VASI of the microneedling combined with tacrolimus ointment (group II) at week 4, 8, 12 and 24 of therapy more than their VASI scores at baseline with p-value <0.001, < 0.001, < 0.001 and < 0.001 respectively. Also there was significant decrease in vitiligo surface area (VSA) at week 4, 8 12 and 24 more than their scores at baseline with p-value = <0.001, < 0.001, < 0.001 and < 0.001 respectively. Abd-Elazim et al. [29]. enrolled thirty-five patients with vitiligo. In each individual, we selected three areas of vitiliginous skin. Three different types of lesions were treated: (A) with tacrolimus 0.03% ointment, (B) with tacrolimus and microdermabrasion by (Reviderm, skin peeler expert) and (C) with petrolatum as a placebo.There was improvement in VASI in group (B) after 6 months. Kanokrungsee et al. [27]. found that the (VSA) significantly decreased on tacrolimus side, when compared to the baseline, P = 0.004. The assessment of repigmentation in our study in the microneedling combined with tacrolimus (group II) ,at week 12, there was no repigmentation in (10.0percent) of the participants ,poor repigmentation in (0.0percent) of participants, moderate repigmentation in (3.3percent) of patients, good repigmentation in (10.0percent) of patients and (76.7percent) with excellent repigmentation. The results of patients in Ebrahim & Albalate [30]. study was consistent with our results in the microneedling combined with tacrolimus (group II) regarding the assessment of repigmentation. Table 2 shows that there is no statistically significant distinction among the 2 groups in terms of VASI & vitiligo surface area at baseline (p = 0.252 and 0.449, correspondingly). Table 3 shows that there is statistically significant difference found between the two studied groups regarding VASI and vitiligo surface area at 12 weeks with p-value <0.001 and < 0.001 respectively. The table also shows that there is statistically significant increase in the assessment of repgimentation in tacrolimus group than latanoprost group with p-value < 0.001, there is highly statistically significant increase in the pattern of diffuse regimentation in tacrolimus group than latanoprost group with p-value = 0.005.There is statistically significant increase in the percentage of patients with burning sensation and itching in tacrolimus group than latanoprost group with p-value < 0.001.

**Table 1:** Demographic data & characteristics of the studied patients.

| | | No. = 30 pts |
|---|---|---|
| **Age (years)** | Mean±SD | 41.0 ± 14.41 |
| | Range | 18 – 70 |
| **Gender** | Females | 21 (70.0%) |
| | Males | 9 (30.0%) |
| **Age at onset of vitiligo (years)** | Mean±SD | 34.80 ± 13.18 |
| | Range | 14 – 57 |
| **Duration of the disease (years)** | Median (IQR) | 5 (2 – 8) |
| | Range | 1 – 30 |
| **Family history of vitiligo** | Negative | 25 (83.3%) |
| | Positive | 5 (16.7%) |
| **Poliosis** | No poliosis | 22 (73.3%) |
| | Poliosis of scalp hair | 3 (10.0%) |
| | Poliosis of moustache hair | 2 (6.7%) |
| | Poliosis of eye brow hair | 3 (10.0%) |
| **Mucosal involvement** | No involvement | 18 (60.0%) |
| | Lip mucosa | 12 (40.0%) |

**Table 2:** Comparison among the two studied groups regarding VASI and surface area at baseline.

| At baseline | | Latanoprost group | Tacrolimus group | Test value | P-value | Sig. |
|---|---|---|---|---|---|---|
| | | No. = 30 | No. = 30 | | | |
| **VASI** | Median (IQR) | 0.06 (0.03– 0.06) | 0.06 (0.06 – 0.13) | -1.145• | 0.252 | NS |
| | Range | 0.02 – 0.25 | 0.02 – 0.25 | | | |
| **Vitiligo surface area (VSA, cm2)** | Median (IQR) | 6 (4 – 12) | 6.75 (4 – 12.5) | -0.757• | 0.449 | NS |
| | Range | 1 – 29 | 2 – 28 | | | |

P > 0.05: Non significant (NS); P < 0.05: Significant; P < 0.01: Highly significant

•: Mann-Whitney test

**Table 3:** Comparison between the two studied groups at 12 weeks.

| After 12 weeks | | Latanoprost group | Tacrolimus group | Test value | P-value | Sig. |
|---|---|---|---|---|---|---|
| | | Median (IQR) | Median (IQR) | | | |
| **VASI** | Median (IQR) | 0.04(0.02 – 0.06) | 0.01 (0 – 0.02) | -3.527• | 0.000 | HS |
| | Range | 0 – 0.25 | 0 – 0.09 | | | |
| **vitiligo surface area (VSA, 2)** | Median (IQR) | 3.6 (2 – 6.8) | 0.64 (0.24 – 1.5) | -3.723• | 0.000 | HS |
| | Range | 0 – 29 | 0 – 19.6 | | | |
| **Assessment of repigmentation** | 0% | 4 (13.3%) | 3 (10.0%) | 29.780 | 0.000 | HS |
| | 1% - 25% | 5 (16.7%) | 0 (0.0%) | | | |
| | 26% - 50% | 14 (46.7%) | 1 (3.3%) | | | |
| | 51%-75% | 3 (10.0%) | 3 (10.0%) | | | |
| | 76%-100% | 4 (13.3%) | 23 (76.7%) | | | |
| | Median (IQR) | 37.5 (25 – 50) | 90 (80 – 95) | -3.781• | 0.000 | HS |
| | Range | 0 – 100 | 0 – 100 | | | |
| **Patterns of repigmentation** | No repigmentation | 4 (13.3%) | 1 (3.3%) | 1.964* | 0.161 | NS |
| | Marginal repigmentation | 23 (76.7%) | 23 (76.7%) | 0.000* | 1.000 | NS |
| | Diffuse repigmentation | 4 (13.3%) | 14 (46.7%) | 7.937* | 0.005 | HS |
| | Erythema | 4 (13.3%) | 1 (3.3%) | 1.964* | 0.161 | NS |
| | Medium spotted repigmentation | 2 (6.7%) | 2 (6.7%) | 0.000* | 1.000 | NS |
| | Perifollicular repigmentation | 0 (0.0%) | 1 (3.3%) | 1.017* | 0.313 | NS |
| **Side effects** | No side effect | 29 (96.7%) | 4 (13.3%) | 42.088* | 0.000 | HS |
| | Burning sensation and itching | 1 (3.3%) | 26 (86.7%) | | | |

P > 0.05: Non significant (NS); P < 0.05: Significant(S); P < 0.01: Highly significant (HS).

•: Mann-Whitney test; *: Chi-square test.

**Table 4:** Follow up of VASI and vitiligo surface area at different times of measurement in latanoprost group.

| Latanoprost group | Baseline | 4 weeks | 8 weeks | 12 weeks | 24 weeks | Test value• | P-value | Sig. |
|---|---|---|---|---|---|---|---|---|
| **VASI** | | | | | | | | |
| **Median (IQR)** | 0.06 (0.03-0.06) | 0.06 (0.03–0.12) | 0.05 (0.03-0.09) | 0.04 (0.02-0.06) | 0.04 (0.019-0.088) | 88.057 | <0.001 | HS |
| **Range** | 0.02 – 0.25 | 0.01 – 0.48 | 0.01 – 0.25 | 0 – 0.25 | 0 – 0.25 | | | |
| **P-value*** | -- | 0.006 | <0.001 | <0.001 | 0.001 | | | |
| **Vitiligo surface area** | | | | | | | | |
| **Median (IQR)** | 6 (4 – 12) | 5.25 (3.6 –11.4) | 4.2 (2.55-10.2) | 3.6 (2 – 6.8) | 3.6 (2 – 6.8) | 102.661 | <0.001 | HS |
| **Range** | 1 – 29 | 1 – 29 | 0.75 – 29 | 0 – 29 | 0 – 29 | | | |
| **P-value*** | -- | <0.001 | <0.001 | <0.001 | <0.001 | | | |

•: Friedman test; *: Wilcoxon Rank test.

**Table 5:** Follow up of VASI and vitiligo surface area at different times of measurement in Tacrolimus group.

| Tacrolimus group | Baseline | 4 weeks | 8 weeks | 12 weeks | 24 weeks | Test value• | P-value | Sig. |
|---|---|---|---|---|---|---|---|---|
| **VASI** | | | | | | | | |
| **Median (IQR)** | 0.06 (0.06-0.13) | 0.06 (0.05-0.11) | 0.03 (0.01-0.06) | 0.01 (0 – 0.02) | 0.006 (0.003-0.019) | 105.068 | <0.001 | HS |
| **Range** | 0.02 – 0.25 | 0.01 – 0.25 | 0 – 0.18 | 0 – 0.09 | 0 – 0.088 | | | |
| **P-value*** | -- | <0.001 | <0.001 | <0.001 | <0.001 | | | |
| **Vitiligo surface area** | | | | | | | | |
| **Median (IQR)** | 6.75 (4 – 12.5) | 5.93 (3.6 – 11.4) | 3.35 (1.68 – 5.25) | 0.64 (0.24 – 1.5) | 0.6 (0.2 – 1.5) | 111.797 | <0.001 | HS |
| **Range** | 2 – 28 | 1.8 – 26.6 | 0.25 – 22.4 | 0 – 19.6 | 0 – 19.6 | | | |
| **P-value*** | -- | <0.001 | <0.001 | <0.001 | <0.001 | | | |

•: Friedman test; *: Wilcoxon Rank test.

**Figure 1**:Female patient 58 years old with acrofacial vitiligo, at baseline treated with tacrolimus on the RT side and latanoprost on the LT side. .

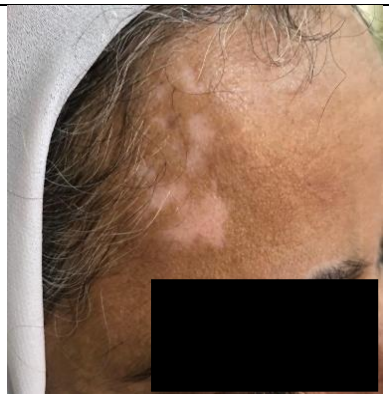

**Figure 1** (Right a): VASI of the vitiligo lesion at baseline =0.125

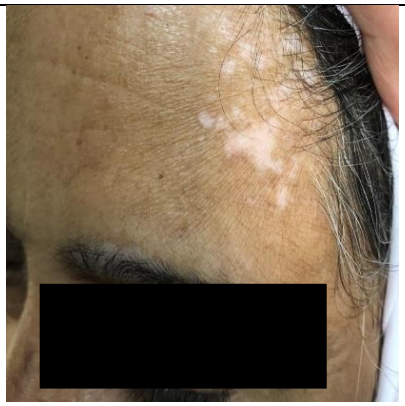

**Figure 1** (Left a): VASI of the vitiligo lesion at baseline =0.125

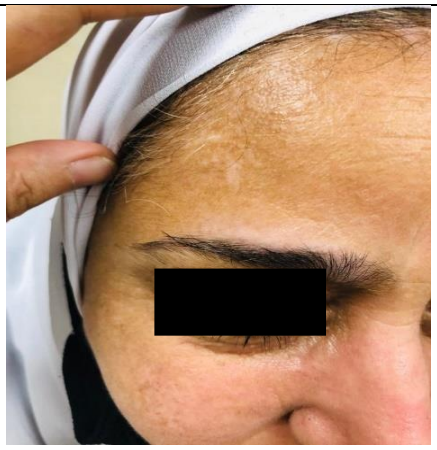

**Figure 1** (Right b): Marginal and diffuse repigmentation of the vitiligo lesion after 24 weeks.Excellent repigmentation(95%).VASI =0.00625

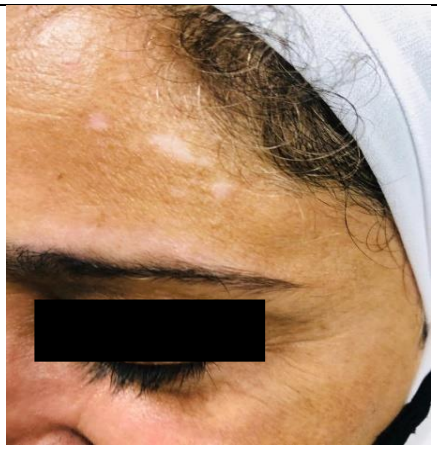

**Figure 1** (Left b): Marginal and diffuse repigmentation of the vitiligo lesion after 24 weeks. Moderate repigmentation(60%). VASI =0.05

Table 4 shows that the VASI in the latanoprost group reduced considerably from baseline at 4, 8, 12 and 24 weeks, with respective p-values of = 0.006,< 0.001, <0.001 and <0.001. In addition, the table demonstrates a statistically significant decrease in vitiligo surface area at 4, 8, 12 and 24 weeks relative to baseline, with p-values of< 0.001, <0.001,< 0.001 & < 0.001, respectively. Table 5 displays a statistically significant reduction in VASI of the tacrolimus group from baseline at 4, 8, 12 and 24 weeks, with p-values < 0.001, <0.001,< 0.001 and< 0.001 for each time point, respectively. The table also displays a statistically significant reduction in vitiligo surface area from baseline at 4, 8, 12 and 24 weeks, with p-values of <0.001, <0.001, <0.001 & <0.001 correspondingly. It was discovered that 76.6% of those in group I had an excellent or good reaction (combined microneedling with tacrolimus). Regarding the pattern of repigmentation in our study in microneedling combined with tacrolimus (group II) showed different patterns of repigmentation,at week 12, there was marginal repigmentation in (76.7%) of patients, Medium spotted repigmentation in (6.7percent) of patients, (3.3%) of patients with erythema, diffuse type in (46.7%) of patients and with (3.3%) perifollicular repigmentation. The different repigmentation patterns of vitiligo lesions are determined by the source and condition of melanocytes, as well as their ability to generate melanin, while selecting a treatment. Ebrahim & Albalate [30]. reported that the pattern of repigmentation of their study was diffuse in (66.6percent). Perifollicular repigmentation in (10%), marginal in (6.6%) in patients treated with microneedling and tacrolimus. Their results is consistent with our results regarding the presence of different pattern of repigmentation but the percentage of each pattern is different may be due to different number of enrolled patients in each study. Regarding the side effects of the topical treatments of our study; there was significant increase in the percentage of patients' side effects in tacrolimus group than latanoprost group. In tacrolimus group about (86.7percent) have itching and burning sensation. The study of Ho et al. [31]. which is a double-blind, randomized, placebo-controlled trial of topical tacrolimus 0·1% vs. clobetasol propionate 0·05% in childhood vitiligo was consistent with our study regarding side effects of topical tacrolimus. They reported some irritation, burning and pruritis with topical tacrolimus. The study by Dailami et al. [32]. on the use of latanoprost in the treatment of eyelid of vitiligo was compatible with our findings with no significant adverse effects or complication was observed in both groups.

## 4. Conclusions

The results showed that treating acrofacial vitiligo with a combination of tacrolimus and microneedling was the most effective method.

**Conflicts of interest:** No conflicts of interest were encountered.

## References


[1] A.F. Nahhas, Ahmed F. Nahhas, T.L. Braunberger, Taylor L. Braunberger, & I.H. Hamzavi, Iltefat H. Hamzavi. (2019). Update on the Management of Vitiligo. Skin Therapy Letter; 24(3):1-6.

[2] K. Boniface, Karine Boniface, J. Seneschal, Julien Seneschal, M. Picardo, Mauro Picardo, & A. Taïeb, Alain Taïeb. (2018). Vitiligo: focus on clinical aspects, immunopathogenesis, and therapy. Clinical reviews in allergy & immunology; 54(1): 52-67.

[3] J.H. Wu, Jia-Hui Wu, & B.A. Cohen, Bernard A. Cohen. (2019). The stigma of skin disease. Current Opinions in Pediatrics; 31(4):509–14.

[4] K. Ezzedine, Khaled Ezzedine, H. Lim, Henry W. Lim, T. Suzuki, Takashi Suzuki, I. Katayama, Ichiro Katayama, I. Hamzavi, Iltefat H. Hamzavi, C. Lan, & et al. (2012). Revised classification/nomenclature of vitiligo and related issues: the Vitiligo Global Issues Consensus Conference. Pigment Cell & Melanoma Research; 25(3).

[5] T. Passeron, Thierry Passeron. (2017). Medical and maintenance treatments for vitiligo. Dermatologic Clinics; 35(2): 163 – 70.

[6] N. Bagherani, Nader Bagherani. (2016). Comparison of pimecrolimus with clobetasol propionate in the treatment of localized vitiligo. Dermatologic Therapy; 29(4): 288.

[7] A. Taieb, Alain Taieb, A. Alomar, Antonio Alomar, M. Bohm, Markus Bohm, & et al. (2013). Guidelines for the management of vitiligo: the European Dermatology Forum consensus. The British Journal of Dermatology; 168(5): 5 – 19.

[8] M. Malathi, Murali Malathi, & D.M. Thappa, Devinder M. Thappa. (2016). Topical therapy in vitiligo: What is new?. Pigment International; 3(1): 1-4.

[9] S. Gianfaldoni, Simone Gianfaldoni, U. Wollina, Uwe Wollina, G. Tchernev, Georgi Tchernev, J. Lotti, Jouni Lotti, K. França, Kristian França, & T. Lotti, Torello Lotti. (2018). Vitiligo in Children: A Review of Conventional Treatments. Macedonian Journal of Medical Sciences; 6(1): 213-217.

[10] A. Abdelmaksoud, Ahmed Abdelmaksoud, D.D. Dave, Deepak D. Dave, T. Lotti, Torello Lotti, M. Vestita, Mario Vestita, & et al. (2019). Topical methotrexate 1% gel for treatment of vitiligo: A case report and review of the literature. Journal of Dermatologic Therapy; 32(3): e13013.

[11] A. Singh, Ashish Singh, & S. Yadav, Sunil Yadav. (2016). Microneedling: Advances and widening horizons. Indian Dermatology Online Journal; 7(4): 244–254.

[12] A.C. Garza, Ana C. Garza, & D. Kroshinsky, Daniel Kroshinsky. (2017). Low-dose Methotrexate for Vitiligo. Journal of Drugs in Dermatology; 16(7): 705-706.

[13] P.E. Grimes, Pearl E. Grimes, & R. Nashawati, Rania Nashawati. (2017). Depigmentation therapies for vitiligo. Dermatologic Clinics; 35(2): 219 – 27.

[14] J.E. Harris, M. Rashighi, N. Nguyen, A. Jabbari, G. Ulerio, R. Clynes, A.M. Christiano and J. Mackay-Wiggan. (2016). Rapid skin repigmentation on oral ruxolitinib in a patient with coexistent vitiligo and

alopecia areata (AA). Journal of the American Academy of Dermatology, 74(2)370-371.

[15] J.M. Bae, B.Y. Hong, J.H. Lee, J.H. Lee, G.M. Kim (2017). The efficacy of 308-nm excimer laser/light (EL) and topical agent combination therapy versus EL monotherapy for vitiligo: a systematic review and meta-analysis of randomized controlled trials (RCTs). Journal of American Academy of Dermatology; 74(5):907-915.

[16] X.Y. Zhang, Y.L. He, J. Dong, et al (2010). Clinical efficacy of a 308 nm excimer laser in the treatment of vitiligo. Photodermatology, Photoimmunology & Photomedicine; 26(3):138–42.

[17] W. Chen, Y. Zhou, F.R. Huang, D. Luo, D.G. Wang (2018). Preliminary Study on the Treatment of Vitiligo With Carbon Dioxide Fractional Laser Together With Tacrolimus. Lasers in Surgery and Medicine; (50):829–836.

[18] M. Rodrigues, K. Ezzedine, I. Hamzavi, et al (2017). Vitiligo Working Group. Current and emerging treatments for vitiligo. Journal of American Academy of Dermatology; 77(1):17-29.

[19] B.S. Daniel, R. Wittall (2015). Vitiligo treatment update. Australasian Journal of Dermatology; (56), 85–92.

[20] F. Kaliyadan, A. Kumar (2012). Camouflage for patients with vitiligo. Indian Journal of Dermatology, Venereology and Leprology; 78(1):8-15.

[21] M. Cavalie, K. Ezzedine, E. Fontas, et al (2015). Maintenance therapy of adult vitiligo with 0.1% tacrolimus ointment: a randomized, double-blind, placebo-controlled study. Journal of Investigative Dermatology; (135): 970 – 974.

[22] T. Passeron. (2017). Medical and maintenance treatments for vitiligo. Dermatologic clinics, 35(2), pp.163-170.

[23] G. Serrano, P. Almudéver, J.M. Serrano, J. Cortijo, C. Faus, M. Reyes, et al (2015). Microneedling dilates the follicular infundibulum and increases transfollicular absorption of liposomal sepia melanin. Clinical, Cosmetic & Investigative Dermatology; (8):313–318.

[24] T.S. Anbar, T.S. El-Ammawi, A.T. Abdel-Rahman, M.R. Hanna (2015). The effect of latanoprost on vitiligo: a preliminary comparative study. International Journal of Dermatology; (54), 587–593.

[25] U.R. Hengge (2013). Off-label indications for topical tacrolimus. Hautarzt; (64):752-756.

[26] M. Amer, F. Farag, A. Amer, R. ElKot, R. Mahmoud (2018). Dermapen in the treatment of wrinkles in cigarette smokers and skin aging effectively. Journal of Cosmetic Dermatology; (17):1200.

[27] S.D. Kanokrungsee Pruettivorawongse, N. Rajatanavin (2020). Clinical outcomes of topical bimatoprost for nonsegmental facial vitiligo: A preliminary study. Journal of Cosmetic Dermatology; (20):812–818.

[28] K.M. Tawfik, R.R. Mohamed, H.A. Hamed (2020). Topical latanoprost solution in combination with microneedling in treatment of segmental vitiligo. Al-Azhar Assiut Medical Journal; (18):487.

[29] N.E. Abd-Elazim, H.A. Yassa, A.M. Mahran (2019). Microdermabrasion and topical tacrolimus: A novel combination therapy of vitiligo. Journal of Cosmetic Dermatology; 19(6):1447-1455.

[30] H.M. Ebrahim, R. Elkot, W. Albalate (2020). Combined microneedling with tacrolimus vs tacrolimus monotherapy for vitiligo treatment. Journal of Cosmetic Dermatology; (19):855–862.

[31] N. Ho, E. Pope, M. Weinstein, S. Greenberg, C. Webster, B.R. Efficacy of topical latanoprost in the treatment of eyelidvitiligo: A randomized, double-blind clinical trial study. Journal of Dermatologic Therapy;e13175.