

## Needling, Microneedling and Acupuncture in Dermatology Practice

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### Abstract

**Introduction:** Microneedling, needling and acupuncture are some of the upcoming treatment modalities used in the management conditions. It has been postulated that in microneedling and needling, superficial trauma to the epidermis leads to the production of inflammatory cascade, resulting in production of growth factors that lead to skin rejuvenation.

**Objective:** Our aim of this review paper is to review the current evidence available for the efficacy of microneedling, needling and acupuncture in the management of skin conditions.

**Method:** We reviewed 21 papers which were a combination of pilot studies, systematic reviews, randomised controlled trials and prospective studies. Protocol studies for systematic reviews and non-English publications were excluded in this review.

**Discussion:** We found that microneedling and needling as adjunct therapies are more effective than monotherapy for the management of skin conditions. Meanwhile, the evidence on the efficacy of acupuncture in management of skin conditions is debatable. However, we noted that in all the papers we reviewed, sample sizes are small and risk of bias is high due to poor disclosure of methodology and poor blinding due to the practical nature of the interventions assessed.

**Conclusion:** We conclude that although evidence has shown significant improvement in using microneedling and needling as adjunct therapies, large randomised controlled trials need to be held. This is similar to the evidence for acupuncture as well.

**Keywords:** Needling, Microneedling, Acupuncture

### Efficacy of needling and microneedling as adjunct

Microneedling, also known as collagen induction therapy, is a relatively new treatment modality in dermatology. It is a minimally invasive procedure where fine microneedles are used to puncture the skin superficially to induce minimal injury and subsequently wound healing cascade. It has been hypothesised that this process leads to production of various growth factors such as platelet derived growth factor (PGF), connective tissue growth factor and fibroblast which leads to skin rejuvenation. This then subsequently leads to neovascularisation and neocollagenesis [1-3].

There are many mechanical microneedling devices registered with the US Food and Drug Administration (FDA). The most commonly used are Dermaroller and Dermapen [2,3]. The Dermaroller is a hand-held cylindrical device with 24 circular arrays [2]. The large diversity of needle lengths in Dermaroller serve different purposes. A needle length of 1.5-2mm is usually used for treatment of acne and other scars. Meanwhile, a needle length of 0.5mm or 1 mm is

typically used for management of ageing skin and wrinkles [3]. The Dermaroller is used in vertically, horizontally and diagonally directly on the skin. There are also various models of Dermaroller developed for home use such as the Beauty Mouse [2,3].

The Dermapen is a microneedling device that is spring-loaded which acts like an electrically powered pen as the name suggests [2,3]. This device is more cost effective as it uses disposable needles and guides to adjust the needle length for fractional mechanical resurfacing [3]. The Dermapen works in a stamp-like manner on the skin and is good for treating narrow areas of the skin [2,3].

Meanwhile, needling is the use of 27G needles to treat skin conditions such as vitiligo [4]. The size of the needle is larger than the microneedles in Dermaroller and Dermapen.

### Scars

Multiple studies have been done to prove the efficacy of microneedling for scar treatment. Most studies reviewed in this paper will look at the efficacy of using microneedling alone for scar treatment compared

with using microneedling as an adjunct.

### Abdominal Striae

A comparative study performed by Sanada E et al compared the efficacy of using microneedling alone with microneedling combined with 15-30% trichloroacetic acid in the management of striae rubra in 30 women with abdominal striae rubra. The left side of the abdomen was treated with microneedling alone (Group I) whilst the right was treated with microneedling first and application of 15-30% trichloroacetic acid immediately after (Group II). Baseline photographs and skin biopsies were taken. Photographs of the striae were taken before each session and 3 weeks after the last session. This study showed that treatment with microneedling alone and microneedling with 15-30% trichloroacetic acid had statistically significant differences between the first and follow-up sessions with improvement in length ( $P=0.001$ ), width ( $P=0.001$ ), colour ( $P=0.001$ ) and texture ( $P=0.001$ ). Furthermore, a comparison between both the groups at follow-up sessions showed statistically significant differences in length ( $P=0.006$ ), width ( $P=0.001$ ), colour ( $P=0.049$ ) and texture ( $P=0.041$ ). This study also showed that there is more improvement in striae in Group II compared with Group I as 19 (63.3%) patients in Group II showed good to excellent response whilst only 10 (33.3%) patients in Group I demonstrated this. Meanwhile, skin biopsies taken from Group I at the follow-up session showed increase in collagen fibre content only, whilst Group II showed significant increase in epidermal thickness ( $P=0.005$ ) and collagen fibre content [5].

### Acne Scar

A comparative study by Saadawi A, et al. compared the efficacy of microneedling alone, glycolic acid alone and combined microneedling and glycolic acid peel in the treatment of acne scar. This study was made up of 30 patients who were divided into Group I (microneedling only), Group II (glycolic acid peel only) and Group III (microneedling and glycolic acid peel). Both Groups I and II were treated at two-week intervals for six sessions. Results showed overall statistically significant improvement in acne scarring in all three groups ( $P<0.05$ ). This study also showed statistically significant increase in frequency of very good satisfactory and objective rate in Group III compared to Groups I and II, and in Group I compared to Group II ( $P<0.05$ ) [6].

A randomised controlled trial by Rana S for acne scarring treatment compared the efficacy of microneedling alone versus microneedling with 70% glycolic acid peel. 60 patients with atrophic acne scars were randomised in Group I (microneedling only) and Group II (microneedling and glycolic acid peel). This study ran for 22 weeks. Efficacy was measured the ECCA acne scarring score at baseline and at 22 weeks. The scoring was done by blinded observer. This study reiterated that combination therapy is more efficacious at managing acne scarring than monotherapy as there is more decrease in mean ECCA score in Group II compared to Group I ( $P<0.001$ ) [7].

### Atrophic Scar

A study performed by Majid I looked at the efficacy of microneedling in atrophic facial scars. 37 patients with atrophic scars of varying aetiology with Grade 2 to 4 severity only were included in this study. 1 patient was excluded from this study as he was unable to tolerate the minimum three sessions of treatment required. Microneedling was performed at monthly intervals until a satisfactory outcome

was achieved or a maximum of four sittings. There were 7 patients with Grade 4 scarring, 21 patients with Grade 3 scarring and 9 patients with Grade 2 scarring. Results of this study showed that 21 patients with Grade 3 scarring reported excellent response and all 9 patients with Grade 2 scarring achieved excellent response. This demonstrated that majority of excellent responses were seen in Grade 2 and 3 scarring. Only one patient with Grade 4 scarring achieved an excellent response while the other patients with Grade 4 scarring had good response. No statistical analysis was performed in this study [8].

A randomised controlled trial by Cachafeiro T et al which compared 1340nm non-ablative fractional erbium laser and microneedling for treatment of atrophic acne scars showed that both treatment modalities have no statistically significant difference ( $P=0.264$ ) in efficacy in management of atrophic acne scars. 46 patients were randomised to two groups and received three treatment sessions monthly regardless of assignment. Even though efficacy profile was similar between both groups, patients in the laser group experienced more side effects in terms of developing post-inflammatory hyperpigmentation and prolonged erythema of an average of 3 days compared to 1 day in the microneedling group. This study demonstrated that microneedling has much better side effect profile compared to laser treatment [2,9].

### Hypertrophic Scar

A paper by Eilers et al on combination approach to management of surgical scars suggested that microneedling as an alternative therapy for treatment of hypertrophic surgical scars. This paper also suggested that the use of topical steroids in conjunction with microneedling can lead to enhanced healing of hypertrophic scars post-surgery [2,10].

Similarly, a review by Iriarte C et al showed that burn patients with hypertrophic scarring reported increased satisfaction with a combination treatment of microneedling and topical Vitamin A and C. This review also showed increase in collagen and elastin deposition on histological studies with microneedling [2].

### Melasma

A comparative study by Fabbrocini et al looking at efficacy of combined microneedling with depigmenting serum and depigmenting serum alone demonstrated that microneedling is a useful adjunct in enhancing the absorption of depigmenting serum in the management of melasma. In the 20 patients that were recruited in this study, the left side of the face was treated with depigmenting serum alone and the right with a combination of microneedling and depigmenting serum. The first treatment was performed by a dermatologist and subsequent treatments were performed by patients. Patients were taught how to use a home roller device and apply a depigmenting serum on melasma on the right side of the face. This treatment was performed daily for two months by patients at home. A baseline MASI score was recorded before treatment and then at one and two month intervals. Results showed a more significant improvement in MASI score on the right side of the face compared with the left. On the right side, MASI score at baseline was 19.1 and decreased to 14.4 ( $P < 0.001$ ) and to 9.2 ( $P < 0.001$ ) at one and two month post-operatively respectively. Meanwhile, on the left side, MASI score at baseline was 20.4 and decreased to 17.4 ( $P < 0.5$ ) and to 13.5 ( $P < 0.5$ ) at one and two month post-operatively respectively [11].

A study by Budamakuntla et al compared the use of microneedling with tranexamic acid and tranexamic acid microinjections in the treatment of melasma in 60 patients. Patients were followed-up for three months after three treatment sessions. This study showed that there was 35.72% improvement in mean MASI score in the microinjection group ( $P < 0.01$ ) compared to 44.41% in the microneedling group ( $P < 0.001$ ). This study also demonstrated marked improvement in the microneedling group with 41% of patients reporting 50% improvement in melasma whilst only 26% of patients in the microinjection group reported 50% improvement [2,12].

### Vitiligo

In 2017, a study by BinSheikhan and Al Abadie compared the use of needling combined with laser and laser alone in the treatment of vitiligo. 20 patients were randomised to two groups of ten. All patients in each group with receive a 16-week treatment with 308nm excimer laser. Group 1 patients received only laser treatment whilst Group 2 received both needling and laser treatment. Response to treatment was measured using the Global Assessment Score every four weeks for up to sixteen weeks. Results showed that Group 2 achieved a statistically higher score ( $P < 0.001$ ) compared to Group 1 [4]. They concluded that the addition of needling technique fifteen minutes prior to exposure to the laser gave a significantly better result [4].

Khashaba Elshafy S et al demonstrated that combination treatment of needling and narrowband UVB in the treatment of vitiligo yielded better response than narrowband UVB alone and needling in combination with triamcinolone acetonide. 60 patients with acrofacial vitiligo were randomly put in three groups. Group 1 patients were treated with narrowband UVB only; Group 2 were treated with a combination of needling and triamcinolone acetonide solution and Group 3 patients were treated with a combination of both modalities. Results demonstrated no statistically significant difference in all groups, however, Group 3 had the best outcomes with 40% of patients having a good response and 30% had an excellent response. Meanwhile, 20% of patients had good response and none had an excellent response. 30% and 15% of patients in Group 2 had a good and excellent response respectively. This study also observed that good to excellent response rates increased to 70% with a combination of needling and narrowband UVB treatment [13].

A pilot study by Ahmad et al on needling as an adjunct to narrowband UVB treatment in localised vitiligo showed almost 90% of vitiligo patches showed good to excellent response after six months. 23 patients were recruited for the study with a total of 84 vitiligo patches. Each vitiligo patch on each patient was treated with needling and incremental exposure to narrowband UVB for at least 6 months. 79 (94%) patches showed Grade 3 or more repigmentation [14].

### Acupuncture in Dermatology

Acupuncture is a type of traditional Chinese medicine that has been used in China for more than 2500 years. It involves stimulation of specific points on the skin using needlepoints, pressure or heat [14,15]. Other therapies related to acupuncture include electroacupuncture where an electrical stimulus is applied to acupuncture needles; point application therapy where herbal medicine paste is applied to acupuncture points and bloodletting where a small amount of blood is released by puncturing a superficial blood vessel.19 In

acupuncture, sterile, hair-fine needles are inserted into points and localised regions of the skin, subcutaneous and muscle tissue to initiate release of neurotransmitters, cytokines and growth factors to mediate pain, itch and for skin healing [16,17].

### Psoriasis

Acupuncture is commonly used to treat dermatological conditions in Asia. A systematic review by Berg-Wolf and Burgoon demonstrated that acupuncture improves Psoriasis Area Severity Index (PASI) score. However, noted that sample sizes in the studies reviewed were small and variable in protocols and controls [18,19].

A systematic review of acupuncture on psoriasis by Coyle M et al suggested that acupuncture and related therapies are promising in the management of psoriasis.16 This systematic reviewed looked at six studies with a total of 522 participants. The outcome for this review was an achievement of PASI 60 as Chinese guidelines suggest PASI 60 as treatment goal. None of the studies reviewed in this paper measured quality of life as an outcome. It is noted that the studies included different interventions related to acupuncture such as point application therapy, cupping and bloodletting. Bias was difficult to assess in these studies due to the practical nature of the interventions. The review by Coyle et al showed that there is an increasing number of people achieving clinically and statistically significant improvements with acupuncture therapy in psoriasis. However, the results of this review needs to be interpreted with caution as the sample sizes in the studies included were small and a wide variety of interventions were used [18].

### Urticaria

Systemic reviews by both C Ma and Sivamani R; and Berg-Wolf and Burgoon reported that a randomised, double-blinded study of patients with chronic urticaria by Iraj et al demonstrated that acupuncture significantly reduced the number of episodes and duration of urticarial episodes by more than 50% [15,16,19].

A systematic review by C Ma and Sivamani R also reported that acupuncture resulted in either significant clearance or complete clearance of wheals and increased duration between attacks. This review also showed that there is greater statistically significant clearance of wheals in acupuncture compared to regular antihistamines [15].

A systematic review by Yao Q et al which consisted of 6 randomised controlled trials with 406 participants concluded that acupuncture might be more effective than medications in management of chronic urticaria. Yao Q et al also suggested that acupuncture as an adjunct to medication is superior to drugs in improving global symptoms. Quality of life was not reviewed in the 6 studies included in this review. The conclusion of this review needs to be interpreted with caution as the studies included have high bias risk, poor methodology and lack proper control groups [10]

### Hyperhidrosis

A systematic review by Berg-Wolf and Burgoon reported that acupuncture results in significant reduction in hyperhidrosis compared with patients treated with medications. However, it is worth noting that there are not many randomised controlled trials for hyperhidrosis. Case reports reviewed in this study showed that acupuncture can be helpful in managing hyperhidrosis [16].



## Discussion

### Microneedling and Needling

This review demonstrated that microneedling and needling in combination with other therapies compared with monotherapy generally yielded better results for the underlying skin condition treated. However, it is noted that most studies have small sample sizes and are comparative prospective or pilot studies. Furthermore, some studies reviewed in this paper assessed efficacy of treatment on the same patient with split body areas receiving different treatments [5,11]. This can lead to bias when patient record their overall satisfaction, thus, not giving an accurate assessment of satisfaction as patients are more likely to be more satisfied with the area that had more treatment done. Similarly, treating clinicians assessing the area can be biased as well.

In addition, it is not clear in most studies whether assessment of treatment efficacy is blinded or not as this can easily lead to bias if the assessment were done by the treating dermatologist. Assessment of efficacy is generally done with assessment scores specific to the underlying skin condition treatment, comparative photography and patient satisfaction scores. One study by Sanada E et al compared histological changes as an outcome measure [5]. This outcome measure is can prove to be more objective than assessment scores. It would be useful for more studies to use histological changes as an outcome measure, however, not all patients will find this method acceptable and it can be a financial burden.

Even though there are no large randomised controlled trials reviewed in this literature, small randomised controlled trials are reviewed. They do demonstrate that microneedling therapy as an adjunct is more efficacious compared with monotherapy [2,7,9,12]. Randomised controlled trials generally provide the strongest evidence for assessment of treatment efficacy. Therefore, this shows that microneedling as an adjunct in cutaneous therapy works better than monotherapy. Ideally, large double-blind randomised controlled trials would provide stronger evidence for efficacy, however, it is recognised that due to the practical nature of the intervention, a large double-blind randomised control trial will be almost impossible to conduct. Hence, it would be useful to have large randomised controlled trials where ideally, the follow-up is performed by an independent clinician [20].

As mentioned before, most studies assessing efficacy of microneedling have small sample sizes and are prospective comparative or pilot studies. These studies reviewed in this paper can be used as a guide for planning a study protocol for a large scale randomised controlled trials, which ultimately will provide stronger evidence that microneedling as a treatment adjunct in dermatology is more efficacious than monotherapy [21]. It can be time consuming and costly to perform a large scale randomised controlled trial due to the large number of patients and the practicalities in performing microneedling and various procedures.

### Acupuncture

Studies on efficacy of acupuncture in dermatology are mostly published in Non-English journals. As mentioned previously, most of the studies on acupuncture have small sample sizes and high bias risk due to poor methodology recording. Similarly, results from the reviews in this article have to be interpreted carefully due to the nature of the studies included. It seems to suggest that acupuncture can provide some improvement in management of dermatological

conditions. However, this does not mean that acupuncture should replace conventional medicine in the management of dermatological conditions. More standardised studies need to be performed to assess the efficacy of acupuncture in dermatology.

### Conclusion

In conclusion, microneedling and needling as adjuncts in cutaneous therapy is an emerging field. It has been proven to have minimal side effect profile and is effective at treating skin conditions. There are more uses of microneedling nowadays in cosmetic procedures.

Meanwhile, acupuncture is more commonly used in Eastern medicine for management of multiple conditions, including skin. The efficacy of acupuncture is still debatable in the management of skin conditions.

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