ORIGINAL ARTICLE

EFFICACY OF MICRO-NEEDLING ON POST ACNE SCARS

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Background: Acne effects 80–90% of teenage population all around the world. Resulting scars can lead to facial disfigurement and psychological issues in affected population. To counter this problem many treatment options have been tried including resurfacing lasers, dermabrasion, peeling, fillers, platelet rich plasma therapy etc. All have shown variable results. Among these modalities, micro needling is showing promising results in treatment of acne scars due to collagen induction. This study was conducted to assess efficacy and safety of micro-needling on acne scars. **Methods:** In this cross-sectional study a total of 50 patients (female 35, male 15) underwent treatment for post acne scarring, 4 sessions of micro-needling were done under local anaesthesia 3 weeks apart over the span of 2 months. Initial and follow up qualitative assessment was done. Photographs were taken of each patient on their subsequent visit, they were analysed and compared for final results. Grading was done by using Goodman Baron scale. **Results:** 70% (35) were females and 30% (15) were males with mean age of 27.31±4.41 ranging from 19–35 years. After the treatment of scars, 73% (08) of Grade 4 scars have showed improvement by 2 grades, remaining 27% (03) showed improvement to Grade 3. In 20 patients with Grade 3 scars, 30% (06) showed improvement by 1 grade. Remaining 70% (14) improved by 2 grades. All patients with Grade 2 scar downgraded to grade 1 after treatment. Chi-square test was used to assess pre-treatment and post treatment grading improvement among subjects and was statistically significant. (X^2=30.010 p=000). **Conclusion:** Micro needling is an effective tool for aesthetic improvement of post acne scarring.

Keywords: Acne; Acne scarring; Micro-needling

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INTRODUCTION

Acne is the most common condition encountered in 35–90% of the young population between the age of 11–30 and up to 5% in older individuals.[1–4] Acne scars are formed in some individuals which suffered severe inflammatory response leading to textural changes in superficial and deep dermis.[1,5,6]

Acne scars are emotionally and psychologically distressing to patients and is also a factor contributing to suicide.[7] It is associated with depression, poor self-esteem, body image alteration, anxiety, altered social interactions, embarrassment, anger, poor academics, and unemployment.[8-10] The scenario became more challenging when scars often worsen with ageing or photo damage.[10]

To improve this condition many descriptive classifications are used to classify the scarring and according to which numerous treatments can be done. Goodman and Barron recommend a simple and universal classification system[11] based on the appearance of scars. Treatment is selected after evalua3tion of scars with this scale. There are many therapeutic modalities used for acne scar treatment include punch excision, the laser resurfacing, punch elevation, micro-dermoabrasion, dermal fillers, subcutaneous incision, fat transfer, chemical peels, focal treatment with trichloroacetic acid, cultured fibroblasts, autologous collagen, needle dermabrasion.[12]

In 1995, Orentreich and Orentreich demonstrated "subincions" as a technique to stimulate collage production in depressed scars and skin wrinkles.[13] Desmond Fernandes, used tunnelling technique for upper lip fine wrinkles by inserting a 15-gauge needle in various directions.[14] Camirand and Doucet did innovation by using a tattoo gun to 'needle abrade' the scars instead giving incisions.[15] This technique is very laborious and holes are very shallow to properly stimulate collagen production. All of the above-mentioned techniques worked on the common principle that breaking damaged collagen in the superficial layer of dermis to promote new collagen formation and improve the overall scar. This procedure of CIT (collagen induction therapy) with the help of micro-needling device is used to treat a group of affected patients.

MATERIAL AND METHODS

After approval of institutional review board, this study was conducted in Jinnah Bur/n & Reconstructive Surgery Centre, Lahore from January 2016 to October 2017.All participants were informed

of study and written consent was obtained. Total of 50 patients of Grade 2–4 (using Goodman and Baron Scale) of either gender was included in the study and 45 patients completed the study. Patients with the history of keloid, pregnancy, comorbidities like diabetes, skin or vascular disease, or on immunosuppressive medicines were excluded from the study. The patient assessment was done at the start of treatment. Demographic data, previous treatment, grade of scarring (using Goodman and Baron Scale) and skin type were recorded. Baseline photographs were taken. Patients were subjected to complete blood picture, prothrombin time, prothrombin concentration, and hepatitis B and C markers as routine investigations.

Treatment was performed by the same investigator on every 3rd week for four sittings. Face was thoroughly washed with soap and saline. Areas were marked for treatment. Topical anaesthetic gel (lignocaine and prilocaine) is used as a thick layer over face for the period of 1 hour for proper analgesic effect. Derma-pen at speed of 60-90 cycles per sec with 33-gauge 12 micro-sized needle cartridge is used with depth of 1.5–2.0 mm. 10–12 passes were made in horizontal, vertical and diagonal directions, in a uniform manner. The treatment was stopped at punctate bleeding over treated area. Blood was cleaned with sterile gauze and sterile cold packing was applied for haemostasis. The post procedure oral analgesic is given (Naproxen 550mg in stat, then 1 tab three times a day for 2 days). Treatment is repeated after 3 weeks. Photographs were taken of each patient on their subsequent visit and compared for final results. Final outcome was analysed by an independent observer who was consultant with 10 years of experience and procedure was kept double blind (neither the observer nor patient interacted at any stage). Grading was done by using Goodman Baron scale. Efficacy was determined as at least one step down grading of scar from baseline. Data was entered and analysed in SPSS. Quantitative variables like age was presented as mean and SD. Frequency and percentages were calculated for qualitative variables like gender, grading and side effects. Percentage of subjects with improved grading after post treatment was compared using chi-square with $p<.05$ as statistical significance.

RESULTS

Study included a total of 50 patients 70% (35) were females and 30% (15) were males with mean age of 27.31±4.41 ranging from 19–35 years. Out of 45 patients who completed the follow up,24.4 % (11) were of Grade 4, 44.4% (20) were of Grade 3 and 31.1% (14) were of Grade 2 scars before the treatment. After the treatment of scars, grading was done by using Goodman Baron scale. (Table-1).

In Grade 4 scars, 73% (08) have showed improvement by 2 grades, remaining 27% (03) showed improvement to grade 3 (Figure 1 and 2). In 20 patients with Grade 3 scars, 30% (06) showed improvement by 1 grade. Remaining 70% (14) improved by 2 grades as only hyperpigmented flat marks are left (Figure 3 and 4). All patients with Grade 2 scar downgraded to grade 1 after treatment (Figure 5 and 6). Chi-square test was used to pre-treatment and post treatment grading and was statistically significant. (X^2=30.010 p=000). (Table-22) (Figure-7). Out of 45 patients, 45% (16) observed mild tolerable pain during the procedure as explained in figure-2. We encountered 11.1% (5) patients with hyper-pigmentation primarily due to inadequate sun protection. Tram-trek scarring was observed in one patient only. Otherwise, there was no infection related complication.

Table-1: Demography

Variables n=45	Frequency	Percent
Age Mean=27.3111 SD= 4.44063, Min=19.00, Max=35.00		
< 25 years	15	33.3
> 25 years	30	66.7
Gender		
Male	15	33.3
Female	30	66.7

Table-2: Post treatment improvement in grading

Pre-treatment acne grade	Post treatment acne grade			Total	Chi-square p-value
	Grade 1	Grade 2	Grade 3		
Grade 2	14	0	0	14	X^2=30.010 p= .000
	50.0%	0.0%	0.0%	31.1%	
Grade 3	14	6	0	20	
	50.0%	42.9%	0.0%	44.4%	
Grade 4	0	8	3	11	
	0.0%	57.1%	100.0%	24.4%	
Total	28	14	3	45	
	100.0%	100.0%	100.0%	100.0%	

Figure-1: 27-year-old female with Grade 4 scarring

Figure-2: After completion of treatment scars downgraded to grade 2

Figure-3: 26-year-old female presented with grade 3 scarring

Figure-4: After completion of treatment scars downgraded to grade 1

Figure-5: 23-year-old female presented with grade 2 scaring

Figure-6: After completion of treatment scars downgraded to grade 1

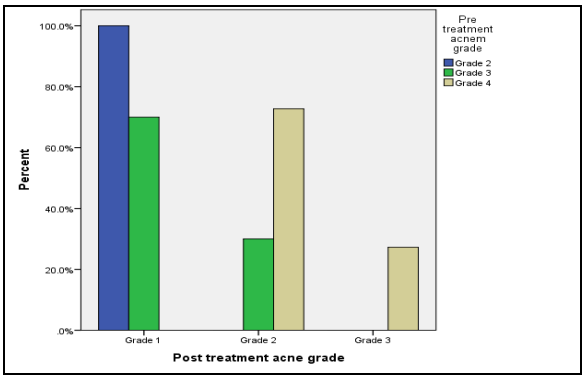

Figure-7: Post treatment improvement in grading

DISCUSSION

A needle puncture into the skin causes localized injury to superficial vessels and minor bleeding. Authors consider that wound healing occurs in three phases following micro-needling treatment.[12] Phase 1, is the inflammatory phase, platelets are the first responder, releasing chemotactic factors which ends in a platelet plug and migration of neutrophils and fibroblasts. During the proliferatory phase, monocytes replace the neutrophils. These neutrophils then transform into macrophages and release a number of growth factors, which stimulates fibroblast migration and proliferation. Activated keratinocytes in response to the basement membrane

injury, starts production of laminin and collagen types IV and VII. The main factor in tissue remodelling (Phase 3) is fibroblast, which laid down collagen type III in upper dermis. This collagen in a year time, replaced with collagen type 1.[16] Recently, a new hypothesis regarding micro-needling is proposed[17] during CIT, microneedles does not create a wound but rather tricks the body in thinking that injury has occurred. This study proposed that bioelectricity which they termed as demarcation current led a chain of events that stimulated production of growth factors. This demarcation current was produced when microneedles punctures the skin which in turns increased the electrical potential of microneedles. Another study[18] demonstrated the resting membrane potential of a living cell to be 70 mV which converted into 100 mV after the tissue injury caused by microneedles. As a result, the cellular activity was increased and there was increased release of growth factors and proteins. Although this mechanism is still poorly understood but this process results in increased collagen production and deposition in the upper dermis. Often, the combinations of several treatments are applied, depending upon the patient. The study however, confirms that in post acne scars CIT provides immediate results. In comparison of dermabrasion and chemical peeling, a study by Fernandes and Signorini[19] confirms that CIT does not damage the epidermis, and has less side effect profile than other two treatments. Histological examination showed increased skin thickness, dermal papillae, elastin and collagen deposition as compared to normal skin also the epidermis is indistinguishable from the surrounding skin. Aust *et al*.[20], also confirmed the histological results of previous studies by reporting the increase in elastin and collagen 6 months postoperatively. After 1 year postoperatively, it also reported 40% thickening of stratum spinosum in epidermis. The therapeutic role of skin needling is in research now and studies have shown that it stimulates revascularization, re-pigmentation of stretch marks and the filling of cutaneous wrinkles.

CONCLUSION

As evident by our study, that skin needling is a simple and rapid method for improvement of acne scars.

AUTHORS' CONTRIBUTION

FAK, SA, SUR, MYM, MS: conceived, designed and did statistical analysis and editing of manuscript. SA, MAY, AMM, SUR: Data collection. FAK, MNT: Final review.

REFERENCES

1. Kranning KK, Odland GF. Prevalence, morbidity and cost of dermatological diseases. J Invest Dermatol 1979;73(5 Pt 2):395–401.
2. Yeung CK, Teo LHY, Xiang LH, Chan HHL. A community-based epidemiological study of acne vulgaris in Hong Kong adolescents. Acta Derm Venereol 2002;82(2):104–7.
3. Kanjee A, Sohail A, Sami A. Topical isotretinoin in the treatment of Acne Vulgaris: A clinical trial. J Pak Assoc Derma 1999;9:20–3.
4. Asad F, Qadir A, Ahmed L. Anxiety and Depression in patients with acne vulgaris. J Pak Assoc Derma 2002;12(2):69–72.
5. Fabbrocini G, Fardella N, Monfrecola A, Proietti I, Innocenzi D. Acne scarring treatment using skin needling. Clin Exp Dermatol 2009;34(8):874–9.
6. Fife D. Practical evaluation and management of atrophic acne scars: tips for the general dermatologist. J Clin Aesthet Dermatol 2011;4(8):50–7.
7. Cotterill JA, Cunliffe WJ. Suicide in dermatologic patients. Br J Dermatol 1997;137(2):246–50.
8. Koo JY, Smith LL. Psychologic aspects of acne. Pediatr Dermatol 1991;8(3):185–8.
9. Koo J. The psychosocial impact of acne: patients' perceptions. J Am Acad Dermatol 1995;32(5 Pt 3):S26–30.
10. Rivera AE. Acne scarring: A review and current treatment modalities. J Am Accad Dermatol 2008;59(4):659–76.
11. Jacob CI, Dover JS, Kaminer MS. Acne scarring: A classification system and review of treatment options. J Am Acad Dermatol 2001;45(1):109–17.
12. Fabbrocini G, Annunziata MC, D'Arco V, Vita DV, Lodi G, Mauriello MC, *et al.* Acne Scars: Pathogenesis, Classification and Treatment. Dermatol Res Pract 2010;2010:893080.
13. Orentreich DS, Orentreich N. Subcutaneous incisionless (subcision) surgery for the correction of depressed scars and wrinkles. Dermatol Surg 1995;21(6):543–9.
14. Fernandes D. Minimally invasive percutaneous collagen induction. Oral Maxillofac Surg Clin North Am 2005;17(1):51–63.
15. Camirand A, Doucet J. Needle dermabrasion. Aesthetic Plast Surg 1997;21(1):48–51.
16. Cohen IK, Die-gelmann RF, Lindblad WJ, Hugo NE. Wound healing: biochemical and clinical aspects. Plast Reconstr Surg 1992;90(5):926.
17. Liebl H. Abstract reflections about collagen induction therapy (CIT). A hypothesis for the mechanism of action of collagen induction therapy (CIT) using micro-needles. [Internet]. [cited 2008 30 Oct]. Available from: http://www.dermaroller.de/us/science/abstract-reflections-26.html
18. Jaffe LF. Control of development by steady ionic currents. Fed Proc 1981;40(2):125–7.
19. Fernandes D, Signorini M. Combating photoaging with percutaneous collagen induction. Clin Dermatol 2008;26(2):192–9.
20. Aust MC, Fernandes D, Kolokythas P, Kaplan HM, Voqt PM. Percutaneous collagen induction therapy. An alternative treatment for scars, wrinkles, and skin laxity. Plast Reconstr Surg 2008;121(4):1421–9.

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