ORIGINAL ARTICLE

SIMPLE MICRONEEDLING VERSUS MICRONEEDLING WITH TOPICAL INSULIN IN THE TREATMENT OF POST ACNE ATROPHIC SCARS; A SPLIT FACE COMPARATIVE STUDY

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Background: Acne vulgaris is a common skin condition, involving upto 90% of the teenage population, being more common in women than in men. Post acne scars are the sequelae, leading to low esteem and self confidence in the affected individuals. **Methods:** Thirty patients participated in the study. On each patient, over the left side of the face, microneedling was done using topical insulin as a medium, while on the right side of the face, simple microneedling was done. Four such sessions, a month apart, were done in all the patients. They were called for follow up and the response was based on the "Acne scar assessment scale", in which Grade-0 referred to no improvement, Grade-1 referred to an improvement of less than 25%, Grade-2 was an improvement between 25–50%, Grade-3 meant an improvement between 50–75%, and, Grade-4 referred to an improvement of greater than 75%. **Results:** After completion of the sessions, over the left side of the face, where microneedling was done with insulin 11 (36.7%) patients showed Grade-2 improvement, while 19 (63.3%) patients showed Grade-3 improvement. On the right side of the face where simple microneedling was done, 10 (33.3%) patients showed an improvement of Grade-0, and 20 (66.6%) patients showed an improvement of Grade-1. **Conclusion:** After this study, we conclude that microneedling combined with topical insulin, shows better results in patients with scarring. It can be a breakthrough in the treatment of post acne scars, due to easier availability and lesser cost of insulin.

Keywords: Acne vulgaris; Post acne scars; Insulin; Microneedling; Adolescence

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INTRODUCTION

Acne vulgaris is a common skin condition of adolescence, involving almost 90% of the teenage population, globally[1,2], persisting into adulthood in 12–14% of the people affected[3]. It is more common among women than in men.[4] 50–60% of the women are aged between 20–25 years, and 12% are above 25 years of age.[5] It is caused by the inflammation, alteration of keratinization and bacterial invasion by the “Propionebacterium acne”, of the pilosebaceous glands, which is secondary to the increase in androgen production during the pubertal stage.[6,7]

There are multiple factors associated with the development of acne, like smoking, mental stress and dietary habits, including the intake of food which is high in calories and is spicy.[8,9] Avoidance of any of these factors has an important role in the improvement and prevention of the skin condition. Psychological impact of acne is a common phenomenon that has been reported worldwide, as the teenagers affected have a feeling of low esteem and confidence, as compared to their fellow students or colleagues.[10,11]

Post acne atrophic scars are a frequent and bothersome consequence, and can be present in around 20% of the population affected with acne.[12] Scarring that occurs after acne vulgaris, is usually a sequelae to the healing process. It is either caused by a loss of collagen, leading to "Atrophic scars", which is the cause in most of the patients, or by the gain of collagen, and reduced activity of the collagenases, producing "Hypertrophic" and "Keloidal scars".

Atrophic scars are the most common types, and are further divided into the following types: a. Ice pack scars; comprising 60–70% of the scars, are punctiform, with an opening of less than 2 mm and form a typical 'V' shaped infundibulum. b. Boxcar scars; are the second common type, occurring in 20–40% of the patients with scars, they are well, circumscribed, round to oval in shape with a size of 4mm. c. Rolling scars; are the least common type consisting 15–25% of the scars, they have the widest diameter of about 5mm. These scars have an undulating surface as they tie up the dermis to the subcutis. Hypertrophic scars appear as heaved up, solidified and raised scars within the boundary of the injury site and are pinkish in colour.

Keloidal scars are purplish to reddish in colour and extend beyond the borders of the site of the original injury, occurring more commonly over the back.

Most of the patients have all the types of scars concurring at the same time. Many treatment options are available to treat atrophic acne scars, including dermabrasions, fillers, lasers and microneedling.[13,14] Among all of these treatment modalities available, microneedling has given encouraging outcomes, and is usually combined with PRP for better results[15], but having said that, it makes the procedure, overpriced and less readily available. Insulin is known to have a role in wound healing as it has angiogenic, re epithelizing and collagen forming properties with directly producing VGEF and TGEF1 factors.[16] Insulin acts by migrating vascular endothelial cells and keratinocytes towards the wound site, thus, improving formation of new vessels and epithelialization. There are insulin receptor substrates that act as signalling molecules and direct insulin toward the wound. Insulin resistance is one factor, that produces hindrance in the healing process, but, even in such patients, topical application of insulin has shown its response. This factor does not exist in our study and will not be limiting for us, because we have excluded diabetic individuals from our criteria. Unfortunately, not much work has been done in this regard, and the role of insulin in wound healing remains to be an unfolded chapter in the field of medicine, and needs to be widely explored. This became the basis of our work, and we aimed to compare the treatment efficacy of simple microneedling, with that of microneedling done in combination with topical insulin as a medium.

MATERIAL AND METHODS

This split face, comparative study was conducted for a period of six months from April to September 2023, at the dermatology department of PNS Shifa hospital, Karachi, after approval from the local ethical review committee (ERC/2022/DERMA/13) given on 27th April 2023. A total number of thirty patients with post acne atrophic scars were included in this study.The sample size was calculated using OpenEpi, Version 3, open source calculator—SSCohort[1], with 95% confidence interval. The participants who were included in the study were aged more than 18 years and less than 60 years, having a Fitzpatrick skin type ranging from IV-VI. Patients with active nodular or pustular acne lesions, with diabetes mellitus, bleeding disorders, pregnant females and breastfeeding mothers were excluded from the study.

A comparative, split face study was conducted, in which the left side of the face was treated with micro needling done along with regular insulin, used topically as a medium, while the right side was treated with simple micro needling.

All the treatment was done after taking written informed consent from all the patients. Under all aseptic measures, the face was cleaned with gauze piece, which was made wet with sterile saline. Local anaesthesia was applied to numb the face and micro-needling were done using a derma pen tipped with 36 disposable needles (Dr Pen). The protrusion length of the needle was adjusted to 2 mm, till pinpoint bleeds appeared on the face. To prevent any blood crusting on the face, it was being wiped with sterile saline during the procedure. On the left side of the face topical insulin (Human actrapid 40IU/ml) was used as a medium, while on the right side no medium was used, during the procedure. The face was again cleaned after the procedure. Pre and post procedure blood sugar levels were checked in all the patients. Four such sessions were done in all the patients, with every session a month apart, and they were called for follow up one month after all four sessions. They were advised to take preventive measures against the sunlight, and fusidic acid was advised for local application twice daily for five days after the procedure. The minimum sample size (n=30) necessary to conduct a study was recruited in this research.[17]

The assessment of effectiveness was done according to the "Acne scars assessment scale", where Grade 0 showed no improvement, Grade 1 represented an improvement of less than 25%, Grade 2 referred to an improvement of 25–50%, Grade 3 was an improvement of 50–75%, and Grade 4 showed an improvement of greater than75%. Pictures were taken, before the commencement and after the completion of the sessions.

RESULTS

A total number of 30 patients participated in the study, 12 (40%) patients were males and 18 (60%) patients were females. The demographic details are given below. The scars present in our patients were of the atrophic type. Eighteen (60%) patients had icepack scars, 6 (20.0%) patients had boxcar scars, while 4 (13.4%) patients had rolling scars, and 2 (6.6%) patients had mixed type of scars. It is represented in the table below.

Mean duration of acne scars in all our patients was 2.03±2.02 years. At the end of treatment sessions, they were graded based on Acne Scars Assessment Scale. After four sessions of treatment, the left side of the face which was treated with microneedling combined with insulin as a topical medium, 11 (36.7%) patients reported Grade II improvement (25–50%), and the remaining 19 (63.3%) patients reported Grade III improvement (50-75%) (Figure-1). On the right side where simple microneedling was done, 20 (66.7%) patients reported no improvement (Grade 0) and 10 (33.3%) reported an improvement of less than 25% (Grade 1). The extent of improvement in acne scars was compared for microneedling combined with topical insulin on the left side of the face, to that with simple microneedling done on the right side of the face, as shown with detail in table 3.

Table-1: Demographic profile of study participants (n=30)

Demographic variables		Frequency (%)
Gender	Male	12 (40)
	Female	18 (60)
Marital status	Married	22 (73.3)
	Unmarried	8 (26.7)
Age (mean ± SD) in years		29.47±8.36

Table-2: Frequency of different scar types present in our patients.

Type of acne lesion	Frequency (%)
1. Ice pick scars	18 (60)
2.Boxcar scars	6 (20.0)
3.Rolling	4 (13.4)
4.Mixed	2 (6.6)

Table-3: Extent of improvement in acne scars with microneedling done alone vs microneedling done with topical regular insulin.

Graded improvement	Mirco-needling with insulin, n (%)	Simple microneedling, n (%)	*p*-value
Grade 0	0	10 (33.3)	0.000
Grade I	0	20 (66.7)	
Grade II	11 (36.7)		
Grade III	19 (63.3)		
Grade IV	0	0	

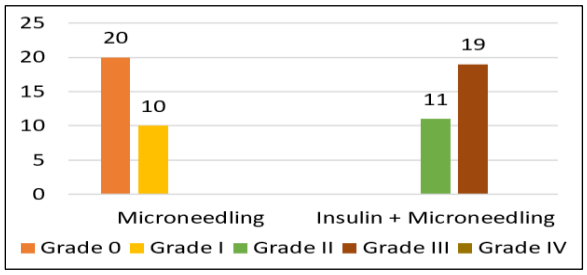

Figure I: Graded improvement in two study groups (microneedling alone vs microneedling done with topical insulin) after four sessions of treatment.

Figure-2. A: Before and after treatment with simple microneedling. B: Before and after treatment with microneedling along with topical insulin

DISCUSSION

Microneedling is a safe and an effective method of treatment in patients with scarring secondary to acne vulgaris. It promotes neo-collagenesis, leading to skin healing and repair, as stated by Farrukh *et al*[13], who conducted his study on 50 patients with acne scars, treated them with microneedling and did the same number of sessions as ours, after which he reported improvement by two grades in 36 (73%) patients. We have used topical insulin as a medium in our study on one side of the face. Insulin known to promote healing in wounds and scars by neo-vascularzation, endothelial proliferation and formation of granulation tissue, with faster epithelization rates, attributed to IGF-1. Among the 30 patients who participated in our study, out of which 18 (60%) they were females and 12 (40%) were males, with a mean duration of scars of 2 years. These patients had three types of atrophic scars, with icepick scars in 18 (60%),boxcar scars in 6 (20.0%), rolling scars in 4(13.4%) and mixed type of scars in 2 (6.6%) patients, also reported by Goodrazi *et al.*[19] According to our work, on the left side of the face , where topical insulin was used as an adjuvant, improvement of grade II was observed in 11 (36.7%) patients and an improvement of grade III in 18 (63.3%) patients, which is much higher than Pawar and Singh *et al*[20] who reported that 45% of their patients showed a positive response, which is quite less than our result and this difference, might be attributed to the fact that the above mentioned study had a smaller sample size and, short termed follow ups, moreover, abbas *et al*[21] reported significant improvement ranging from grade 2 to grade 4 in 16 (53.3%) patients which is closer to our result.

The right side of the face showed no improvement in 10 (33.3%) patients, and, grade I improvement in 20 (66.7%), this is much similar to Dogra *et al*[22], who stated that improvement was seen in 22 (73%) patients, quite similar to what we achieved after our study, also, Rasheed *et al*[23] stated that most of the patients in his study reported satisfactory results with microneedling, and this better efficacy might be because he compared microneedling with glycolic acid peels. About adverse effects, only one of our patients reported erythema, that remained for about a week, but settled after that, and the next session was done more gently, considering the sensitivity of the skin of the patient and, hence did not occur in the subsequent sessions. One of our patients reported pain, but that was mild, and was reduced after longer duration of application of the topical anaesthesia. These adverse effects were also reported by abbas *et al*, but the frequency in our study was much lesser. Our patients were asked about the level of satisfaction they

had and majority of them were joyous to see the results after four sessions.

CONCLUSION

After our study, it is clearly evident that microneedling when done with topical insulin as an adjunct, showed significant and superior results than simple microneedling, leading to better healing of the scars and satisfaction among the patients. Insulin, being cost-effective and easily available can bring a breakthrough in the treatment of these scars, as everyone will have an easy access, in contrast to other modalities that are expensive and not frequently available.

Much work is hereby needed in this regard to increase the authenticity of this treatment modality, especially in diabetic patients, as they might get more beneficial results, but their blood sugar levels, need to be taken into consideration and monitoring.

AUTHORS' CONTRIBUTION

MA: Literature search, conceptualization of study design, data collection, data analysis and interpretation, article writing. NA: Literature search, conceptualization of study design, data collection, data analysis and interpretation, proof reading. SK: Literature search, conceptualization of study design, data collection, data analysis and interpretation, proof reading.

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