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MICRONEEDLING IN ACNE SCAR TREATMENT: LITERATURE REVIEW

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ABSTRACT

OBJECTIVE: To evaluate, through a literature review, the efficacy of microneedling in the treatment of acne scars. METHODS: Narrative literature review, using the PubMed and VHL databases, using the descriptors "micro needling", "acne vulgaris" and "scar". The chosen articles were dated from 2018 to 2023, totaling 134 articles. Of these, 18 were selected by title and abstract, and in the end, 8 by full reading, based on inclusion and exclusion criteria, analyzing the effectiveness of microneedling. RESULTS: Microneedling can reduce the degree of acne scarring effectively, when well indicated, and it is possible to associate it with other treatments, such as platelet-rich plasma, topical insulin, subcision, CROSS (Chemical Reconstruction of Skin Scars), chemical peeling, botulinum toxin type A and topical products, improving its results. On the other hand, its possible adverse effects include transient erythema, pain, and edema. CONCLUSION: It is concluded that microneedling treatment is effective in reducing the degree of acne scarring, especially when combined with other therapeutic modalities, presenting benefits that outweigh the financial costs and the occurrence of side effects.

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INTRODUCTION

Acne vulgaris is a chronic and inflammatory disease of the pilosebaceous unit (Ahramiyanpour et al., 2022), which is characterized by the presence of various elementary lesions, such as open and closed comedones, papules, pustules, nodules, and cysts (Chilicka et al., 2022), with post-acne scarring being the most common consequence of the disorder (Albalat et al., 2022; Gowda et al., 2021; Chilicka et al., 2022)., affecting about 95% of patients (Ishfaq et al., 2022). With the advancement of chemistry, which is the area of aesthetic medicine, micro needling has emerged as a relatively safe therapeutic modality for many dermatological conditions, such as acne vulgaris, cutaneous atrophic striation, keloid, melasma, androgenetic alopecia, hyperhidrosis, facial rejuvenation, and for the transdermal administration of drugs (Albalat et al., 2022; Ishfaq et al., 2022).

Microneedling is a minimally invasive technique that consists of successive punctures in multiple directions in regions affected by acne scars (Bhargava et al 2023; Sitohang et al., 2021; Nandini et al., 2022), through sterile microneedles that pierce the epidermis and dermis, promoting the release of growth factors, such as Transforming Growth Factor Alpha (TGF-α), Transforming Growth Factor Beta (TGF-β), Vascular Endothelial Growth Factor (VEGF), Epidermal Growth Factor (EGF), Fibroblast Growth Factor 7 (FGF-7) and Platelet-Derived Growth Factor (PDGF), which, in turn, triggers neovascularization and neocollagenesis, especially of collagen types I, III, and VII (Albalat et al., 2022; Gowda et al., 2021; Chilicka et al., 2022).

Although the procedure is an alternative to the treatment of acne scars, the cost of using the technique is still an important barrier to the wide dissemination and performance by patients, because, in general, three sessions of microneedling monotherapy are necessary to improve the appearance of acne scars (Sitohang et al., 2021). The present study, therefore, aims to evaluate the efficacy of microneedling treatment in reducing acne vulgaris scarring.

METHODOLOGY

This is a narrative literature review, carried out from August to October 2023, in the PubMed and VHL databases, using the descriptors "*micro needling*", "acne *vulgaris*" and "*scar*". The articles elected are between the years 2018 and 2023, totaling 134 articles. Of these, 18 studies were selected and, subsequently, 8 articles, by reading in full, based on

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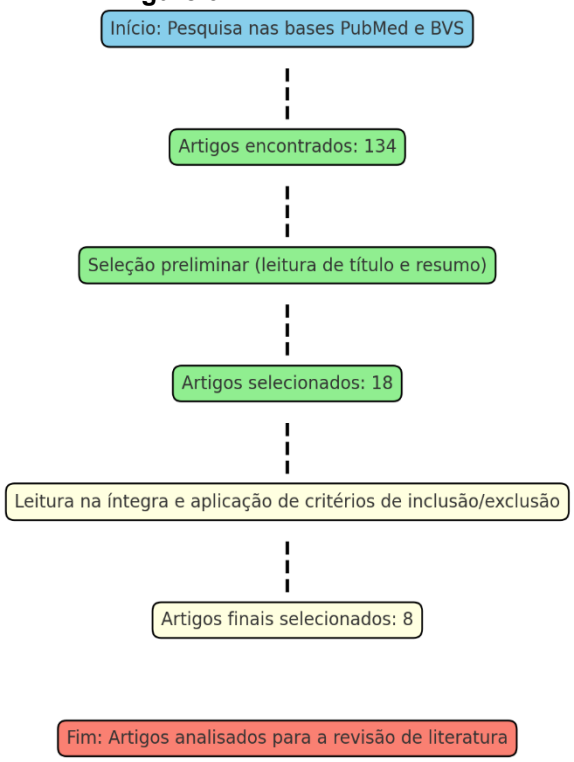
the inclusion criteria, which would be English, Portuguese, and Spanish, the relevance of the title, the relevance of the article, and the free articles, and exclusion, which would be the unavailability in full and the paid articles. Figure 1 represents the process of selecting articles for the literature review.

Figure 01- Prism Flowchart



Source: Authorial (2025).

RESULTS

In a comparative study, two groups of patients with atrophic scars were analyzed, with group A undergoing treatment with microneedling associated with platelet-rich plasma and group B undergoing therapy with microneedling alone. Regarding the results, 43% of patients in group A had an excellent response compared to 20% of individuals in group B, according to the medical evaluation. Regarding satisfaction, patients in group A felt happier when compared to group B, because, in group A, 36% of individuals had more than 75% improvement in acne scars, unlike group B, in which there was only 3% evolution (Nandini et al., 2021).

In another study, a comparison was made in which the hemifaces were divided. On the left side, microneedling combined with platelet-rich plasma was performed, and on the

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right side, microneedling with topical insulin, including 16 patients in total. All patients received 4 sessions of microneedling at monthly intervals and were monitored up to three months after the last session, and the qualitative system used was the *Global* Acne *Scarring System*, to assess therapeutic improvement. Among the 16 total patients, 14 completed the study. The right side of the face showed an improvement of 45% and the left side, 26%. A paired t-test showed significant improvement on the right sides (t = 12.20; P = 0.01) and left face (t = 2.67, P = 0.03). An unpaired t-test showed comparable progress on both hemifaces, but the ice pick and wagon scars responded better to therapy plus topical insulin. Adverse effects included transient erythema (n = 8), pain (n = 6), and edema (n = 3), however, there was no depigmentation or scarring, and no change in serum glucose levels was observed (Pawar et al., 2020).

In a recent study, microneedling associated with the use of subcision was analyzed, evaluating 45 patients in total. Before the start of treatment, 29 individuals had grade IV acne scars, 12 patients had grade III acne scars, and 4 had grade II acne scars. Among patients with grade IV acne scars, 31% showed 2-grade improvement and 69% progressed from grade IV to grade III. 16.7% showed a progress of 2 degrees, 75% of one degree and only one patient did not show any improvement. 75% of patients with grade II acne scars progressed to grade I. In addition, 3 months after starting treatment, 95.6% of patients had a reduction in the degree of acne scar of at least 1 degree, with no failure rate (Bhargava et al., 2019).

In a scientific article, a retrospective review of the medical records of all patients with acne scars treated with the combination of *Chemical Reconstruction of Skin Scars* (CROSS), mainly with phenol, subcision, a two-level cannula, and microneedling was performed. A total of 139 patients were analyzed, of whom 89 (64%) had *Fitzpatrick* skin types IV, V, and VI, receiving an average of 2 treatments for each individual. The combination therapy resulted in high patient satisfaction and improvement of acne scars, as per photographic evidence. In addition, all patients showed improvement in the appearance of acne scars and were happy with the results (Lee and Rullan, 2018).

In a randomized, double-blind, controlled trial, 120 patients underwent microneedling alone, chemical *peel* monotherapy, and microneedling associated with chemical *peel* therapies. Considering the results, only the group that underwent the combined treatment, including 40 individuals, had a statistically significant improvement (p=0.0005), according to the Goodman and Baron scale. Evaluating the patients who

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underwent microneedling and chemical *peeling*, 25 female and 5 male patients showed improvements in skin appearance after treatment, and 5 women and 5 men did not evolve with improvement of acne scars (Pakla-Misiur et al., 2021).

In a randomized controlled trial, 60 patients with acne scars were evaluated, and divided into two groups, with group A treated with microneedling and group B with a 35% glycolic acid chemical peel therapy. Analyzing the results, 73.3% (n=22) of patients in group A and 33.3% (n=10) in group B were effectively treated, according to the efficacy criteria (p=0.001) of the study. In addition, 26.7% (n=8) of individuals in group A and 66.7% in group B did not show improvement after treatment (p=0.001). Therefore, in the treatment of acne scars, microneedling is more effective than *chemical peeling* of glycolic acid at 35% (Ishfaq et al., 2022)

In a study conducted with 30 patients, the right side of the face was treated with microneedling and platelet-rich plasma, and the left side with microneedling and botulinum toxin type A. Qualitatively, evaluating the classification of scars before and after therapy, the improvement was statistically significant in both hemifaces, with greater improvement in the right facial side, but not in a statistically relevant way (Albalat et al., 2022).

In addition, a randomized and double-blind clinical trial was also carried out, with the division between the hemifaces, using the techniques of fractional ablative laser Er:YAG and microneedling. A total of 21 patients with post-acne atrophic scars were included and classified in the study, according to the qualitative classification of Goodman and Baron, among whom had *Fitzpatrick skin types* II, III and IV, and 4 of them still manifested active acne lesions. There was a marked improvement on the facial sides of microneedling and fractional ablative laser Er:YAG, evidenced by the significant reduction in the degrees of acne scarring of the subjects, without a significant difference between the two modalities. The clinical analysis performed by two blinded physicians revealed that, on the microneedling side, the improvement was 81.9%, according to the first physician, and 90%, according to the second physician. On the other hand, in the hemiface where the Er:YAG ablative fractional laser was performed, the first physician evaluated an evolution of 82.6%, while the second physician, 83.66% (Emam et al., 2021).

The main results are summarized in Chart 1.

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Chart 1 - Articles selected to compose this study.

Study	Group/Treatment	Medical Evaluation Result	Patient Satisfaction	Improvement in Scar	Adverse Effects
Study 1	Group A: Microneedling + Platelet-Rich PlasmaGroup B: Microneedling	Group A: 43% excellentGroup B: 20% excellent	Group A: 36% with >75% improvementGroup B: 3% with >75% improvement	Biggest improvement in Group A	Not reported
Study 2	Microneedling + Platelet-Rich Plasma (left side)Microneedling + Topical Insulin (right side)	Right side: 45% improvementLeft side: 26% improvement	Not specified	Significant improvement on both sides	Erythema, pain, edema (no depigmentation or scarring)
Study Article 3	Microneedling + Subcision	95.6% reduction in the degree of scars	High satisfaction	1-degree reduction in 95.6% of patients	No failure rate
Study 4	Microneedling + CROSS (phenol) + Subcision	High patient satisfaction	Improvement in acne scars	Significant improvements by photographic evidence	Not reported
Study 5	MicroneedlingChemical PeelingMicroneedling + Chemical Peeling	Only the combined group had a significant improvement (p=0.0005)	Not specified	Combined group had greater improvement	Not reported
Study 6	Microneedling (Group A)Chemical Peeling (Group B)	Group A: 73.3% efficacyGroup B: 33.3% efficacy (p=0.001)	Not specified	Microneedling more effective than chemical peeling	Not reported
Study 7	Microneedling + Platelet Rich Plasma (right side)Microneedling + Botulinum Toxin (left side)	Significant improvements on both sides, higher on the right side	Not specified	Improvements on both sides, more pronounced on the right side	Not reported
Study Article 8	Microneedling vs Fractional Laser Er:YAG	Comparable improvements in both treatments	Not specified	Significant reduction in scarring	Not reported

Source: Authorial (2025).

DISCUSSION

Microneedling therapy was associated with a reduction in the degree of acne vulgaris scarring (Bhargava et al., 2019). In addition to perfecting scars, the procedure improves skin tension, because the technique increases the expression of collagen,

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especially types I, III, and VII (Ahramiyanpour et al., 2022), and elastin (Ishfaq et al., 2022). It was also possible to assess that the side effects of microneedling, including erythema, post-inflammatory hyperpigmentation and any interference with daily activities, are minimal when compared to other modalities available for the treatment of acne scars. Microneedling with a chemical peel of 35% glycolic acid was also analyzed, in which the former proved to be more effective in the treatment of atrophic acne scars, given that microneedling preserves the partial integrity of the epidermis, which, in turn, grants a better recovery of the patient and reduces the risk of secondary contamination (Ishfaq et al., 2022)

In addition, CROSS, with emphasis on the use of phenol, subcision with a bi-level cannula and microneedling, resulted in high patient satisfaction and photographic evidence of improvement in the treatment of acne scars (Lee and Rullan, 2018). Microneedling was also associated with subcision, which demonstrated a synergistic effect in the treatment of atrophic scars, and three months after the start of therapy, 95.6% of patients achieved a reduction of at least one acneic degree (Bhargava et al., 2023). Therefore, to obtain a more improved long-term result, it was seen that microneedling, in association with other treatment methods, has been more used, in addition to demonstrating greater efficacy, due to the different types of scars that patients have and that require restoration of volume, tightening and/or movement of tissue (Bhargava et al., 2023; PAKLA-MISIUR et al., 2021). However, a challenge about microneedling treatment is the cost of the treatment, so for the greater popularization and reach of the practice, with the objectives of improving the appearance and degree of acne scars and the recovery of self-esteem of patients living with the pathology, the costs of the modality must be made more flexible to facilitate access and so that more patients can adhere to the treatment.

The strengths of the present study were the approach of international and national articles, with an evaluation of studies from the last five years. The limitations of the study were the fact that none of the selected articles made a comparison between races, as well as degrees of acne in patients who underwent microneedling in monotherapy. Despite the efforts, the studies gathered did not address the number of sessions that were necessary for microneedling to obtain such results of efficacy and satisfaction.

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CONCLUSION

It is concluded that microneedling treatment, in addition to being relatively safe and minimally invasive, is effective in reducing the degree of acne scarring, especially when combined with other therapeutic modalities, such as platelet-rich plasma, topical insulin, subcision, CROSS, chemical *peeling*, botulinum toxin type A and topical products, presenting benefits that outweigh the financial costs and the occurrence of side effects, such as transient erythema, pain and edema. In addition, the improvement of acne scars, through microneedling, positively impacts the self-esteem of patients who adhere to the modality.

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