

Assessment of Role of Saline injection in Dermatology: Review Article

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ABSTRACT

Background: Adolescence and adulthood are the most common seasons for breakouts of acne, which is a chronic inflammatory skin disease of the pilosebaceous glands. About 85% of teenagers and 40% of adults develop late-onset acne. It is one of the most prevalent dermatological diseases, influenced by genetics and environmental factors. It's still a widespread condition even though acne therapy has improved greatly. The prevention and management of scarring is a continuing concern. One of the most cost-effective and safe methods is intradermal saline injection for post-acne scars, as there are no adverse effects. Saline injections into the dermis and subdermal layers of scar tissue are thought to cause the destruction of collagen fibres and the decomposition of fibrotic bundles by needling.

Objective: Evaluate effectiveness of saline injection for dermatologic diseases.

Conclusion: For post-acne scars, saline injection therapy is a safe and effective treatment option. The involution of the granuloma annulare could be caused by intralesional injections of normal saline.

Keywords: Acne, Dermatology, Saline injection.

INTRODUCTION

For the majority of teens and young adults, pilosebaceous gland inflammation known as acne begins in the adolescent years and lasts into adulthood, with outbreaks sometimes coinciding with changes in serum androgens. About 85% of teenagers and 40% of adults develop late-onset acne. It is one of the most prevalent dermatological diseases, influenced by genetics and environmental factors ⁽¹⁾.

It's still a widespread condition even though acne therapy has improved greatly. The prevention and management of scarring is a continuing concern ⁽²⁾. Atrophic acne scarring pathogenesis is most likely related to inflammatory mediators and enzymatic degradation of collagen fiber and subcutaneous fat ⁽³⁾.

However, additional factors, including patient manipulation of acne lesions, could be added. Acne and acne scarring may have a strong effect on the quality of life of these patients ⁽⁴⁾. *P. acnes* is a bacterium that colonises both the pilo and the sebaceous unit and is responsible for the development of acne. The pilosebaceous unit is a multifactorial process that includes both endogenous and external components ⁽⁵⁾.

Scars can be improved using various treatments, including non-invasive and invasive ones. However, no matter how expensive or effective the therapy is, it is impossible for scars to be completely eliminated. As a result, there is an increasing need for acne scar treatment options that are less intrusive, more effective, and more cheap ⁽²⁾.

The aim of review article to evaluate effectiveness of saline injection for dermatologic diseases.

METHODS

A search strategy has been performed to determine the related literature. Initially, the objective of review was identified. Relevant keywords included: Saline injection, Dermatology and Acne, more synonymous key words had been used.

These databases were searched for articles published in English in 4 data bases [PubMed – Google scholar- The Egyptian Bank of Knowledge - Science direct] and Boolean operators (AND, OR, NOT) had been used such as [Saline injection OR Dermatology And Acne] in peer-reviewed articles, and filtered in selected data basis. However, the range of time interval for researches is wide as there's scarcity of data on the particular reviewed, accurate and depth in the retrieved literature. Papers apart from main scientific studies had been excluded: documents unavailable as total written text, conversation, conference abstract papers and dissertations.

Saline therapy:

Lewins ⁽⁶⁾ reported that saline has been used for cholera treatment. During the European cholera pandemic, it was employed to simulate plasma for the treatment of patients; several modifications were made to concentrations during the following years. Saline is one of the most extensively used crystalloid solutions in today's therapeutic settings for resuscitation, replacement, and maintenance ⁽⁷⁾.

Saline safety:

Swelling, discomfort, and mild ecchymosis have been recorded as side effects of intralesional and infiltration saline injections. Hyperpigmentation, necrosis, and pain at the injection site were all common side effects of Hypotonic Saline (HS 15 percent) in treatment for leishmaniasis. Using saline as a soak has not been associated with any negative side effects ⁽⁸⁾.

Saline in dermatology:

Injections of saline into the tissue and the surrounding area:

Saline for cutaneous atrophy caused by corticosteroids:

Topical glucocorticoids are most commonly associated with skin atrophy. It has a cigarette paper-like

consistency to the skin and is characterized by a thinning and shimmering appearance⁽⁹⁾.

A new treatment option was proposed for corticosteroid-induced cutaneous atrophy: normal saline infusion or Ringer's lactate tumescence. Local chronic corticosteroid-induced atrophy can be treated safely, tolerably, quickly, and effectively with normal saline infusion. The steroid crystals that have been deposited in the skin are put back into the suspension and then cleared by the body's defence mechanism, with each injection of saline improving the process. Saline infusion can also be used to cut fibrous adhesions, similar to subcision, in order to restore the surface contour⁽¹⁰⁾.

Saline for atrophic acne scars:

Bagherani and Smoller⁽¹¹⁾ revealed safe and efficient treatment for scars caused by post-acne for the first time in 2015 with saline injection therapy. Saline therapy is thought to work by stimulating collagen production and remodelling by fibroblasts, cutting collagen fibres anchoring the superficial dermis to the dermal and subdermal layers, and releasing fibrotic lesions in a way similar to subcision in atrophic acne scars, according to the hypothesised mechanisms for its effectiveness. Clots that form from injection-related bleeding elevate the epidermis above the underlying scar tissue and serve as a scaffold for neoformation of the extracellular matrix. The growth factors released by white blood cells and platelets can be stimulated by saline, which can lead to tissue growth.

Saline for Granuloma annulare (GA):

Intralesional injections of normal saline (NS) can promote granuloma annulare (GA) involution to the same extent as intralesional steroid injections, according to a study⁽¹²⁾. Because of the lack of atrophy, saline injections often generated a better first cosmetic result. In the treatment of GA, the researchers suggest first trying saline injections before turning to triamcinolone⁽¹³⁾.

Saline in Cutaneous leishmaniasis:

Protozoa of the Leishmania genus produce leishmaniasis, a disease with a wide range of symptoms. Cutaneous leishmaniasis (CL) is the most frequent form of leishmaniasis in the world. This disease is self-limiting, however treatment is focused on slowing down its progression and minimising damage to the affected tissues. One of the most efficient and extensively used treatments for leishmaniasis has been sodium stibogluconate (SSG)⁽¹⁴⁾.

Saline as a sclerosant:

Sympathizing with this technique is the goal of full-thickness wall destruction and an intramural thrombus, which will eliminate any remaining abnormal blood vessels. The osmotic sclerosants, which include hypertonic saline (HS), cause dehydration and rupture of the endothelium cellular membrane, resulting in the

breakdown of the vascular wall. Although the effects of 23.4 percent HS in combination with dextrose are immediately diluted and the majority of the effects are confined, if extravasation occurs severe tissue damage may ensue⁽¹⁵⁾.

Using an intradermal saline injection to dilate dermal capillaries helped prevent cutaneous ulcers by creating a protective barrier between the vascular lesion and the skin. Sclerotherapeutic efficacy could be improved by using larger quantities of stronger sclerotic agents in the treatment of even superficial venous malformation lesions, thanks to this method⁽¹⁶⁾.

Saline as control in Dermatology research:

Saline has some therapeutic effects in many dermatological indications, including warts, acne scarring and rejuvenation, even when it is administered as a control. Face-lifting effects can be achieved by injecting botulinum toxin A (ABO) diluted at 1:7 cc with normal saline solution (NSS) on one side and NSS on the other⁽¹⁷⁾. 27.5 percent of patients who had saline injections as a control for verruca treatment showed complete improvement as found by **Nofal and Nofal**⁽¹⁸⁾ study and 10% in **Awal and Kaur**⁽¹⁹⁾ study.

Injection with intralesional steroid (ILs):

Local anesthetic or isotonic saline solution can be used to dilute intralesional steroids. While deciding on a diluent is largely a matter of taste, there are a few things to keep in mind. A burning feeling might result from the acidic pH of lidocaine. As a result, the ideal diluent for IL-S injections is isotonic saline solution. Lidocaine is recommended only in cases of severe fibrosis⁽²⁰⁾.

Preservatives such as parabens or phenols may precipitate the triamcinolone hexacetonide salt, increasing the risk of steroid deposition in the dermis and tissue atrophy, hence it is vital to avoid mixing it with diluents or local anesthetics that include these preservatives⁽²¹⁾.

Saline in diagnosis:

Role of saline in direct immunofluorescence:

The gold standard for diagnosing immuno-bullous disorders is direct immunofluorescence (DIF). There are a variety of subgroups of subepidermal immune-bullous disorders (SIBD) that cannot be successfully distinguished using this method in intact skin biopsies⁽²²⁾.

In **Gammon et al.**⁽²³⁾ study, salt split skin was hypothesised to induce skin splitting at lamina lucida, which makes it feasible to distinguish between SIBD and other types of skin splits based on where antibodies are located on the roof and/or the floor of the splits.

NaCl (1 mol/L) solution is used to keep the punch biopsy at 4°C for 24 hours. Then, using a fine forceps, the epidermis was pulled away from the dermis. The specimens then processed in the same manner and treated with immunoglobulins and complement conjugates as in DIF⁽²²⁾.

The use of NS as a transport medium for skin tissues submitted to DIF tests was shown in a study to aid in the collecting of skin biopsy samples using saline. When contrasted to liquid nitrogen, this helped maintain the architecture intact ⁽²⁴⁾.

Role of saline in diagnosis of scabies:

Scabies mites may be rendered inert or even killed by a routine treatment with KOH. An experiment was conducted to test a saline mount, in which a skin scraping was treated for an hour with normal saline (NS) in a test-tube before being placed on a clean and grease-free slide, with a coverslip then mounted on it, and a mite was observed to move out of the skin under 40X magnification ⁽²⁵⁾.

CONCLUSION

There has been substantial research into the use of saline injection in dermatology. Saline injection therapy is a safe and effective treatment option for post-acne atrophic scars. Intralesional injections of normal saline could induce involution of granuloma annulare.

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REFERENCES

1. **Bhate K, Williams H (2013):** Epidemiology of acne vulgaris. *Br J Dermatol.*, 168(3): 474–485.
2. **Bhargava S, Cunha P, Lee J et al. (2018):** Acne scarring management: Systematic review and evaluation of the evidence. *Amer J Clin Dermatol.*, 19(4): 459–477.
3. **Hassan J, Grogan S, Clark-Carter D et al. (2009):** The individual health burden of acne: appearance-related distress in male and female adolescents and adults with back, chest and facial acne. *Journal of Health Psychology*, 14(8): 1105–1118.
4. **Abad-Casintahan F, Chow S, Goh C et al. (2011).** Toward evidence-based practice in acne: consensus of an Asian Working Group. *The Journal of Dermatology*, 38(11): 1041–1048.
5. **Contasso E, French L (2014):** New insights into acne pathogenesis: propionibacterium acnes activates the inflammasome. *J Invest Dermatol.*, 134: 310–313.
6. **Lewins R (1832):** Saline injections into the veins. *London Medical Gazette*, 7: 257–68.
7. **Awad S, Allison S, Lobo D (2008):** The history of 0.9% saline. *Clinical Nutrition*, 27(2): 179–188.
8. **El-Amawy H, Sarsik S (2020):** Saline in dermatology: a literature review. *Journal of Cosmetic Dermatology*, 90(4):68-75.
9. **Sterry W, Asadullah K (2002):** Topical glucocorticoid therapy in dermatology. *Springer-Verlag.*, 40 (1):39–54.
10. **Shumaker P, Rao J, Goldman M (2006):** Treatment of local, persistent cutaneous atrophy following corticosteroid injection with normal saline infiltration. *Dermatologic Surgery*, 31(10): 1340–1343.
11. **Bagherani N, Smoller B (2015):** Introduction of a novel therapeutic option for atrophic acne scars: saline injection therapy. *Glob Dermatol.*, 2(6): 225-227.
12. **Kern A (1960):** Injection therapy of granuloma annulare. *AMA Arch Derm.*, 81(6): 135-969.
13. **Sparrow G, Abell E (1975):** Granuloma annulare and necrobiosis lipoidica treated by jet injector. *British Journal of Dermatology*, 93(1): 85–89.
14. **Aronson N, Herwaldt B, Libman M et al. (2016):** Diagnosis and treatment of leishmaniasis: Clinical Practice Guidelines by the Infectious Diseases Society of America (IDSA) and the American Society of Tropical Medicine and Hygiene (ASTMH). *Oxford Journal*, 63(12): 202–264.
15. **Worthington R (2005):** Injection sclerotherapy. *Semin Intervent Radiol.*, 22(3): 209-217.
16. **Kurita M, Ozaki M, Ihara A et al. (2012):** Intradermal injection of normal saline prevents cutaneous complications associated with sclerotherapy for superficial venous malformations. *Plastic and Reconstructive Surgery*, 129(4): 772–774.
17. **Wanithphakdeedecha R, Ungakornpairote C, Kaewkes A et al. (2016):** The comparison between intradermal injection of abobotulinumtoxin A and normal saline for face-lifting: a split-face randomized controlled trial. *Journal of Cosmetic Dermatology*, 15(4): 452–457.
18. **Nofal A, Nofal E (2010):** Intralesional immunotherapy of common warts: successful treatment with mumps, measles and rubella vaccine. *Journal of the European Academy of Dermatology and Venereology*, 24(10): 1166–1170.
19. **Awal G, Kaur S (2018):** Therapeutic outcome of intralesional immunotherapy in cutaneous warts using the mumps, measles, and rubella vaccine: A randomized, placebo-controlled trial. *J Clin Aesthet Dermatol.*, 11(5): 15–20.
20. **Tosti A, Asz-Sigall D, Pirmez R (2020):** Hair and Scalp Treatments: A Practical Guide. Springer, (1st ed.), Pp. 161-176. <https://dokumen.pub/hair-and-scalp-treatments-a-practical-guide-1st-ed-2020-978-3-030-21554-5-978-3-030-21555-2.html>
21. **Pirmez R, Abraham L, Duque-Estrada B et al. (2017):** Trichoscopy of steroid-induced atrophy. *Skin Appendage Disorders*, 3(4): 171–174.
22. **Abhishek D, Raghavendra R, Balachandran C (2010):** Salt split technique: A useful tool in the diagnosis of subepidermal bullous disorders. *Indian J Dermatol.*, 55(4):334-336.
23. **Gammon W, Briggaman R, Inman A et al. (1984):** Differentiating anti-lamina lucida and anti-sublamina densa anti-BMZ antibodies by indirect immunofluorescence on 1.0 M sodium chloride-separated skin. *Journal of Investigative Dermatology*, 82(2): 139–144.
24. **Patel A, Simpson R, Cohen S (2013):** In a patient with an immune-bullous disorder, is transportation of the skin biopsy in normal saline adequate for direct immunofluorescence analysis? A critically appraised topic. *British Journal of Dermatology*, 169(1): 6-10.
25. **Kandi V (2017):** Laboratory diagnosis of scabies using a simple saline mount: A clinical microbiologist's report. *Cureus*, 9(3):1102-1109.