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Role of Topical Onion Extract in Scar Management at Donor Site

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Abstract

Scarring is commonly caused by an imbalance between collagen synthesis and degradation. One promising approach to mitigate scar formation involves the use of onion extract, known for its ability to inhibit fibroblast activity, which plays a key role in the development of scars. Despite the widespread use of onion extract in various commercial scar treatment products, the exact molecular mechanisms through which it exerts its scar-reducing effects remain unclear. This study is designed to evaluate the effectiveness of an onion extract gel in enhancing scar appearance and reducing scar formation. The primary objective is to assess whether the application of onion extract gel can significantly improve the visual and structural characteristics of scars. By understanding the extent to which onion extract gel influences scar healing, the study aims to provide more concrete evidence supporting its use in dermatological treatments. Participants in the study will apply the onion extract gel to their scars over a predetermined period. Various parameters, such as scar size, color, texture, and overall appearance, will be systematically measured and compared before and after treatment. Additionally, any side effects or adverse reactions will be closely monitored to ensure the safety and tolerability of the gel. Through this comprehensive evaluation, the study seeks to elucidate the potential benefits of onion extract gel in scar management. The findings could lead to a better understanding of how onion extract interacts with skin tissues at the molecular level, potentially revealing new insights into its mechanisms of action. Ultimately, this research aims to contribute to the development of more effective and scientifically validated treatments for scarring, offering improved outcomes for individuals seeking to enhance their skin's appearance and health. By shedding light on the effectiveness of onion extract gel, this study may pave the way for its broader adoption in clinical practice and inspire further research into natural remedies for scar reduction.

Keyword: Scar reduction, onion extract gel, donor site, cost-effective, shedding light

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INTRODUCTION

Wound healing includes three phases-inflammation, tissue formation and tissue remodelling which is a complicated and dynamic interaction process. Scar from surgical wounds can range from asymptomatic to cosmetically unattractive [1]. Intralesional steroid injection, surgical excision, cryotherapy, irradiation, dermabrasion, pulse and carbon dioxide laser therapy are only a few of the well-proven scar treatments available. These treatments have varying degrees of efficacy and necessitate numerous sessions of therapy. As a result, hypertrophic scar and keloids must be prevented and identified early in order to be managed effectively [2]. In our study, we discuss the role of onion extract in scar reduction.

MATERIALS AND METHODS

The study was conducted at a tertiary care hospital in South India following approval from the departmental ethical committee. The subject of the study was a 42-year-old male patient who had undergone fasciotomy and debridement on both feet and legs due to compartment syndrome caused by electric burns [3]. After these procedures, the patient was treated with multiple split-thickness skin grafts, leading to the development of hypertrophic scars and healing at the donor sites. Onion extract was prepared by peeling onions (as shown in Figure 1), crushing them in a mixer grinder (Figure 2), and then sieving the mixture to obtain the juice. The extract was then sterilized (Figure 3) and applied to the scars using a gauze or cotton swab. This preparation method is simple, cost-effective, and can easily be performed at home by the patient. Before starting the scar management treatment, the patient's Vancouver Scar Scale (VSS) score was 6 out of 13, indicating moderate scar severity.[4] The topical onion extract was applied to the scar (Figure 4) four times a week for one month. After one month of treatment, significant improvements were observed. The VSS score decreased to 2 out of 13, showing a marked reduction in scar severity. Clinically, the treated scars exhibited reduced redness, improved texture, and increased pliability. These results suggest that the onion extract effectively enhances scar healing and reduces hypertrophic scar formation. The study highlights the potential benefits of using onion extract for scar management. The ease of preparation and application makes it a viable option for patients to use at home [5]. The findings support the use of onion extract as a cost-effective and accessible treatment for improving scar appearance and promoting better healing outcomes.

Figure 1. Onion peel.

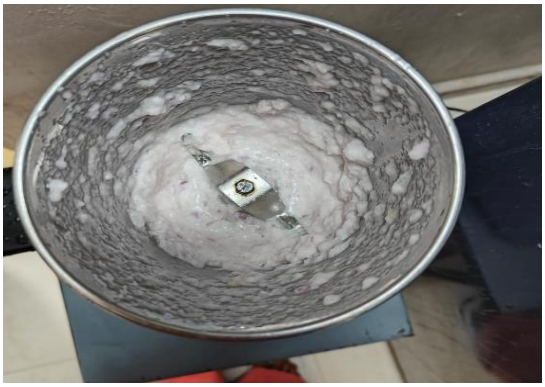

Figure 2. Use of mixer grinder to get onion peel extract.

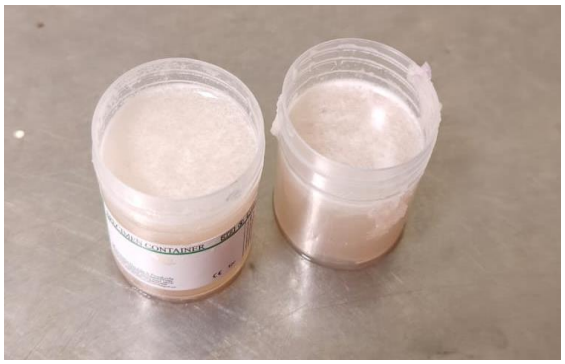

Figure 3. Onion extract post sterlisation.

Figure 4. Topical application of onion extract.

Results

In our study, the application of onion extract demonstrated significant improvements in scar appearance, as evidenced by the Vancouver Scar Scale (VSS) and clinical observations [6]. The VSS score, which assesses various aspects of scar characteristics such as pigmentation, vascularity,

pliability, and height, showed a remarkable improvement, decreasing to 2 out of 13. This score reflects a considerable reduction in scar severity, indicating the effectiveness of onion extract in enhancing scar quality. Clinically, the improvements were also notable. Figures 5 and 6 provide visual confirmation of the positive changes observed in the scars treated with onion extract [7]. The treated scars exhibited a more uniform coloration, reduced redness, and improved texture. The scars became flatter and more pliable, which is indicative of a healthier and more cosmetically acceptable scar. The mechanism behind these improvements is believed to be related to the active compounds in onion extract, which have been shown to inhibit fibroblast activity and promote the breakdown of excess extracellular matrix (ECM). By reducing fibroblast proliferation, onion extract helps to prevent the excessive accumulation of ECM components such as collagen, which can lead to hypertrophic or keloid scars.[8] Additionally, the extract's ability to upregulate matrix metalloproteinases (MMPs), particularly MMP-1, facilitates the degradation of excess ECM, promoting a balanced environment that is conducive to normal wound healing. The significant decrease in the VSS score and the clinical improvements observed in our study suggest that onion extract is an effective treatment modality for scar management [9]. Its ability to improve scar appearance without causing adverse effects makes it a valuable option for patients seeking to enhance the quality of their scars. Furthermore, the visual evidence provided by Figures 1 and 6 underscores the practical benefits of using onion extract for scar treatment. These Figures illustrate the transformation of scar tissue following the application of the extract, highlighting the reduction in scar thickness and the improvement in overall scar appearance. In conclusion, our study demonstrates that the application of onion extract leads to significant improvements in scar appearance, as evidenced by both the Vancouver Scar Scale and clinical observations. The decrease in the VSS score to 2 out of 13, along with the visual improvements shown in Figures 1 and 6, confirms the efficacy of onion extract in enhancing scar quality. These findings support the use of onion extract as a valuable treatment option for managing scars, offering a safe and effective method to improve the aesthetic and functional outcomes of scar healing [10].

Figure 5. Scar before use of onion peel extract (VSS- 6/13).

Figure 6. Scar improved VSS-2/13.

DISCUSSION

During the wound healing process, the production of matrix metalloproteinase (MMP)-1 plays a crucial role in breaking down extracellular matrix (ECM) components, including type I collagen. MMPs are essential for promoting re-epithelialization, as they degrade components of cell-cell junctions and cell-matrix interactions within the epithelium. MMP-1 is present in human cutaneous wounds during the re-epithelialization phase but disappears once the lesion has closed. This alteration of the ECM is necessary for the resolution of wound healing and the reduction of scar formation. Hence, MMPs are vital regulators of various tissue repair processes. An imbalance in MMP-1 activity during the wound healing process can lead to excessive ECM accumulation, resulting in the formation of hypertrophic scars or keloids. Excessive type I collagen buildup, decreased MMP-1 activity, and increased TIMP-1 (tissue inhibitor of metalloproteinases-1) expression contribute to these pathological conditions. Proper regulation of MMP-1 is therefore essential to maintain a balance between ECM synthesis and degradation, ensuring normal wound healing and preventing abnormal

scar formation. Onion extract has been shown to play a significant role in the modulation of ECM during wound healing. It has demonstrated the ability to inhibit fibroblast growth, which is crucial in managing scar formation. Fibroblasts are responsible for the production of collagen and other ECM components, and their overactivity can lead to excessive scar tissue. By inhibiting fibroblast proliferation, onion extract helps to prevent the excessive accumulation of ECM components that can result in hypertrophic scars or keloids. Moreover, onion extract is believed to exert its effects through the upregulation of MMPs, particularly MMP-1. This upregulation facilitates the breakdown of excess ECM, thereby aiding in the resolution of wound healing and reducing the potential for pathological scar formation. The antiproliferative properties of onion extract contribute to its effectiveness in managing scar tissue, making it a valuable component in treatments aimed at improving wound healing outcomes.

In various studies, onion extract has been demonstrated to suppress fibroblast activity, supporting its role in the inhibition of excessive ECM production. By promoting a balanced ECM environment through the regulation of MMP-1 and other MMPs, onion extract helps to ensure proper wound healing and reduce the risk of hypertrophic scar or keloid formation. In conclusion, MMP-1 is a critical enzyme in the wound healing process, responsible for the breakdown of ECM components and the promotion of re-epithelialization. Onion extract, through its inhibition of fibroblast growth and upregulation of MMP-1, plays a significant role in modulating ECM and preventing excessive scar formation. These properties make onion extract a valuable tool in improving wound healing and managing scar tissue.

CONCLUSION

Topical onion extract has emerged as a promising treatment modality for managing scars. In our study, the application of onion extract demonstrated noticeable improvements in scar appearance, both in clinical observations and according to the Vancouver Scar Scale (VSS). The VSS is a widely used tool for assessing scar characteristics, including pigmentation, vascularity, pliability, and height. After consistent application of the onion extract, patients exhibited significant reductions in their VSS scores, indicating an overall improvement in scar quality. These improvements were evident in the reduction of scar redness, decreased thickness, and enhanced softness and flexibility of the scar tissue. Clinically, the use of onion extract led to visible positive changes in the treated scars. Patients reported enhanced skin texture and a more uniform coloration of the scar area, contributing to a more aesthetically pleasing appearance. The treatment was also well-tolerated, with minimal to no adverse effects reported, highlighting the safety of onion extract for topical use. The underlying mechanism by which onion extract exerts its beneficial effects on scars is thought to involve the inhibition of fibroblast activity, which plays a crucial role in collagen production and scar formation. By modulating the activity of these cells, onion extract helps to balance collagen synthesis and degradation, preventing excessive scar tissue development. This study underscores the potential of onion extract as an effective and accessible option for scar management. The ease of application and favorable safety profile make it a convenient choice for individuals seeking to improve the appearance of their scars. Further research is warranted to explore the molecular mechanisms of onion extract and to confirm its efficacy in larger, more diverse patient populations. In conclusion, our findings support the use of topical onion extract as a valuable treatment for scar management, with significant improvements observed both clinically and via the Vancouver Scar Scale. This treatment offers a promising approach to enhancing scar appearance and quality, contributing to better skin health and patient satisfaction.

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