

COMPARISON OF EFFICACY OF TOPICAL TAZAROTENE 0.1% CREAM VS ADEPALENE 0.3% AND BENZOYL PEROXIDE 2.5% IN TREATING ATROPHIC ACNE SCARS

MUSHTAQ F^{1*}, KHAN MR¹, SALEEM M¹, KHAN A¹, AMIN S¹, MUSHTAQ I²

¹Department of Dermatology, PIMS Islamabad, Pakistan

²Department of Dermatology, CMH Multan, Pakistan

*Correspondence author email address: fasiha_awan@yahoo.com

(Received, 27th July 2024, Revised 10th September 2024, Published 17th September 2024)

Abstract: Atrophic acne scars are a common dermatological concern that significantly impacts patients' self-esteem and quality of life. Topical treatments such as Tazarotene and combinations of Adapalene and Benzoyl Peroxide are often used to improve the appearance of these scars. However, their comparative effectiveness requires further evaluation. **Objective:** To evaluate the effectiveness of Tazarotene 0.1% cream versus a combination of Adapalene 0.3% and Benzoyl Peroxide 2.5% in treating atrophic acne scars. **Methods:** This study was conducted in the Dermatology Department of PIMS, Islamabad, from January to June 2024, following approval from the hospital's ethical committee. A total of 140 participants with atrophic acne scars were enrolled and divided into two groups. Group A received Tazarotene 0.1% cream, while Group B was treated with a combination of Adapalene 0.3% and Benzoyl Peroxide 2.5%, both applied once daily at night. The treatment duration was 12 weeks. The severity of acne scars was assessed using the Global Atrophic Acne Scar Scale (GAASS), and the impact on quality of life was measured using the Quality-of-Life Score. Statistical analysis was performed using SPSS Version 26, with significance set at $p < 0.05$. **Results:** The mean age of participants was 40.40 ± 11.24 years. Before treatment, GAASS scores were comparable between Group A (3.70 ± 0.64) and Group B (3.80 ± 0.65 , $p = 0.36$). After 12 weeks, Group A showed significantly greater improvement, with a mean GAASS score of 1.72 ± 0.63 compared to 2.17 ± 0.77 in Group B ($p = 0.00$). Patient satisfaction was also higher in Group A (7.4 ± 1.5) compared to Group B (6.8 ± 1.7 , $p = 0.00$). The Quality-of-Life Score was slightly higher in Group A (85.3 ± 5.2) than in Group B (82.7 ± 6.1), although this difference was not statistically significant ($p = 0.14$). Side effects were reported in 17.1% of Group A and 27.1% of Group B ($p = 0.15$). **Conclusion:** Tazarotene 0.1% cream was more effective than the combination of Adapalene 0.3% and Benzoyl Peroxide 2.5% in treating atrophic acne scars. Despite no significant difference in quality-of-life improvements between the two treatments, tazarotene patients experienced more significant scar reduction, higher satisfaction, and fewer side effects.

Keywords: GAASS Score, Tazarotene, atrophic acne scars, Adapalene.

Introduction

Atrophic acne scars are a common and often distressing consequence of acne vulgaris, characterized by depressions in the skin that result from insufficient collagen production during the healing process. (1) These scars can significantly impact an individual's psychological and social well-being, highlighting the need for effective treatments that improve skin texture and appearance. (2, 3) Among the topical therapies available, retinoids such as Tazarotene and Adapalene, combined with Benzoyl Peroxide, are widely recognized for their role in managing acne and its sequelae, including atrophic scars. (4, 5)

Acne is a prevalent condition that impacts up to 90% of adolescents to varying extents. (6) It is attributed to a combination of factors such as the activity of Propionibacterium acnes, elevated sebum production, androgenic stimulation, follicular hyperkeratinization, and an inflammatory response involving lymphocytes, macrophages, and neutrophils, along with the activation of cytokines. (7, 8) The development of atrophic acne scarring is primarily associated with inflammatory mediators and the enzymatic breakdown of collagen fibers and subcutaneous fat. (9) The most basic and practical system divides atrophic acne scars into three main types: ice pick, rolling, and boxcar scars. (10)

Acne is a common condition in Pakistan, affecting a significant portion of the adolescent and young adult population. The resulting atrophic acne scars can profoundly impact individuals' quality of life and self-esteem. Understanding the most effective treatments for these scars is crucial for improving patient outcomes. By evaluating the comparative effectiveness of two widely used topical treatments, the present study contributes to the optimization of acne scar management in the local population. Thus, this study aimed to evaluate the effectiveness of topical Tazarotene 0.1% cream vs Adapalene 0.3% and Benzoyl peroxide 2.5% in treating atrophic acne scars.

Methodology

This randomized control trial was conducted at the Department of Dermatology, PIMS, Islamabad, over six months, from January to June 2024. The study focused on patients with atrophic acne scars, aged between 18 and 60 years, from both genders. Patients were selected based on specific inclusion and exclusion criteria. Eligible participants included those who presented with atrophic acne scars but were otherwise free of any active or inflamed acne lesions, including nodulocystic acne. Individuals with

[Citation: Mushtaq, F., Khan, M.R., Saleem, M., Khan, A., Amin, S., Mushtaq, I., (2024). Comparison of efficacy of topical tazarotene 0.1% cream vs adapalene 0.3% and benzoyl peroxide 2.5% in treating atrophic acne scars. *Biol. Clin. Sci. Res. J.*, 2024: 1106. doi: <https://doi.org/10.54112/bcsrj.v2024i1.1106>]

known hypersensitivity or allergies to Tazarotene, Adapalene, or Benzoyl Peroxide were excluded from the trial. Additionally, patients who had used topical treatments for acne or acne scars, such as retinoids, corticosteroids, antibiotics, or chemical peels within the last eight weeks, were not considered for participation. Other dermatological conditions, including eczema, psoriasis, or rosacea, also served as exclusion criteria. Furthermore, individuals who had undergone cosmetic procedures like laser therapy, microneedling, or dermabrasion targeting acne scars or facial skin within the past six months were excluded. Pregnant or breastfeeding women were also ineligible for the trial.

After the approval of the hospital ethical committee, this study was conducted in the Department of Dermatology PIMS, Islamabad, between Jan 2024 and June 2024. A detailed history was obtained, and a thorough physical examination was conducted. One hundred forty individuals who met the selection criteria were enrolled in the study and divided into two groups. Group A patients were treated with Tazarotene 0.1% cream once daily at night, while participants in Group B were treated with a combination of Adapalene 0.3% and Benzoyl Peroxide 2.5% once daily at night. The treatment duration was 12 weeks, during which all patients were monitored, and the severity of atrophic acne scars was evaluated using the Global Atrophic Acne Scar Scale (GAASS). The Quality of Life Score was also

used to assess acne scars' impact on the patient's overall well-being.

For statistical analysis, SPSS Version 26 was used.

Results

The mean age of all enrolled patients was 40.40±11.24 years. The mean age in Group A was 41.84±11.24 years, while in Group B, it was 38.95±11.14 years. In terms of gender distribution, Group A had 20(28.6%) and 50(71.4%) females (64.7%), whereas Group B had 25(34.3%) males and 46(65.7%) females. When categorized by age groups, 15 (21.4%) were aged 18-30 years, 9 (12.9%) were aged 31-40 years, 28 (40.0%) were aged 41-50 years, and 18 (25.7%) were over 50 years. In Group B (n=70), 18 (25.7%) participants were aged 18-30 years, 16 (22.9%) were aged 31-40 years, 22 (31.4%) were aged 41-50 years, and 14 (20.0%) were over 50 years. Before treatment, the GAASS scores for Group A and Group B were 3.70 ± 0.64 and 3.80 ± 0.65, respectively (p = 0.36). After 12 weeks of treatment, the GAASS score was significantly lower in Group A (1.72 ± 0.63) compared to Group B (2.17 ± 0.77) (p = 0.00). Patient-reported satisfaction was higher in Group A (7.4 ± 1.5) than in Group B (6.8 ± 1.7) (p = 0.00). The Quality of Life Score was also slightly higher in Group A (85.3 ± 5.2) compared to Group B (82.7 ± 6.1), though the difference was not statistically significant (p = 0.14). Side effects were 17.1% in Group A and 27.1% in Group B (p = 0.15).

Table 1: Mean age of all enrolled patients (n=140)

Variables	Mean±SD
Age (Years)	40.40±11.24

Table 2: Demographic Characteristics of Both Groups Patients (n=140)

	Groups	
	Groups A (n=70)	Groups B (n=70)
Age (Years)	41.84±11.24	38.95±11.14
Gender		
Male	20(28.6%)	25(34.3%)
Female	50(71.4%)	46(65.7%)
Age groups		
18-30 years	15(21.4%)	18(25.7%)
31-40 years	9(12.9%)	16(22.9%)
41-50 years	28(40.0%)	22(31.4%)
>50 years	18(25.7%)	14(20.0%)

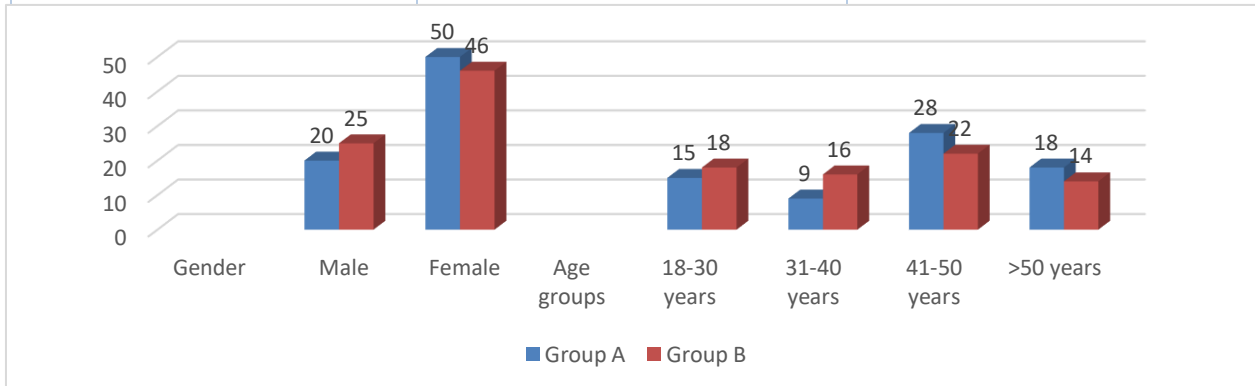


Fig 1: Demographic Characteristics of Both Groups Patients (n=140)

[Citation: Mushtaq, F., Khan, M.R., Saleem, M., Khan, A., Amin, S., Mushtaq, I., (2024). Comparison of efficacy of topical tazarotene 0.1% cream vs adapalene 0.3% and benzoyl peroxide 2.5% in treating atrophic acne scars. *Biol. Clin. Sci. Res. J.*, 2024: 1106. doi: <https://doi.org/10.54112/bcsrj.v2024i1.1106>]

Table 3: Characteristics of both group patients before and after treatment.

	Groups		p-value
	Groups A	Groups B	
GAASS Score			
Baseline	3.70±0.64	3.80±0.65	0.36
After treatment of 12 Weeks	1.72±0.63	2.17±0.77	0.00
Patient-Reported Satisfaction	7.4 ± 1.5	6.8 ± 1.7	0.00
Quality of Life Score	85.3 ± 5.2	82.7 ± 6.1	0.14
Occurrence of Side Effects	12(17.1%)	19(27.1%)	0.15

Discussion

Atrophic acne scars frequently arise due to acne vulgaris, manifesting as depressions or indentations in the skin where acne lesions are present. (11) These scars occur due to insufficient collagen production during the healing phase, leading to a loss of underlying skin tissue. (12, 13) The presence of atrophic acne scars can significantly affect a person's self-esteem and overall quality of life, underscoring the need for effective treatment options. (14) Several therapeutic methods, such as topical treatments, laser therapy, and dermal fillers, are designed to enhance the appearance of these scars by stimulating collagen production and remodeling the damaged skin. (15) The main aim of the present study was to evaluate the effectiveness of topical Tazarotene 0.1% cream vs Adapalene 0.3% and Benzoyl peroxide 2.5% in treating atrophic acne scars. The present study found that Tazarotene 0.1% cream was significantly more effective in reducing the severity of atrophic acne scars than the combination of Adapalene 0.3% and Benzoyl Peroxide 2.5%. Specifically, the Global Atrophic Acne Scar Scale (GAASS) scores showed a more significant improvement in scar appearance for the Tazarotene group. These results align with existing research (5). Topical retinoids like Adapalene and Tazarotene promote dermal collagen production by acting on fibroblasts. (16) Adapalene's effectiveness in preventing atrophic acne scarring is well-established; topical retinoids have also proven successful in treating acne scars. (17, 18) The study's assessment of atrophic acne scars using the Global Atrophic Acne Scar Scale (GAASS) provides valuable insights into the effectiveness of the two treatment regimens. Before treatment, the GAASS scores were comparable between Group A and Group B, with scores of 3.70 ± 0.64 and 3.80 ± 0.65 , respectively ($p = 0.36$). This indicates that both groups had a similar baseline severity of atrophic acne scars. Following 12 weeks of treatment, there was a notable difference in the outcomes between the two groups. Group A, which received Tazarotene 0.1% cream, significantly reduced GAASS scores to 1.72 ± 0.63 . In contrast, Group B, treated with the Adapalene 0.3% and Benzoyl Peroxide 2.5% combination, had a GAASS score of 2.17 ± 0.77 ($p = 0.00$). The p-value of 0.00 indicates a statistically significant difference, demonstrating that Tazarotene was more effective in reducing the severity of atrophic acne scars than the Adapalene and Benzoyl Peroxide combination. The substantial improvement observed in Group A underscores the potential of Tazarotene as a more effective treatment option for atrophic acne scars. This finding suggests that clinicians should consider Tazarotene as a preferred treatment modality for patients with atrophic acne scars, mainly when significant scar reduction is a primary goal.

In the present study, Tazarotene 0.1% cream was associated with higher patient satisfaction and fewer side effects than the Adapalene and Benzoyl Peroxide combination. Despite the lack of significant difference in Quality of Life Scores, the higher satisfaction and lower side effect profile with Tazarotene indicate it may be a more favorable option for treating atrophic acne scars. More extensive studies could further elucidate these trends and assess the long-term benefits of these treatments. Tazarotene 0.1% cream was associated with higher patient satisfaction, as reflected by the study's significantly higher patient-reported satisfaction scores. This greater satisfaction could be attributed to the effectiveness of Tazarotene in improving the appearance of atrophic acne scars, likely due to its mechanism of action, which involves promoting skin cell turnover and enhancing collagen remodeling. (19) These effects reduce scar depth and overall skin texture, leading to more favorable aesthetic outcomes that patients perceive positively.

Additionally, Tazarotene's side effect profile may play a role in higher satisfaction. The study indicated fewer adverse effects, such as irritation and dryness, in patients treated with Tazarotene than those using the Adapalene and Benzoyl Peroxide combination. Reduced side effects likely contributed to a more comfortable and tolerable treatment experience, enhancing patient satisfaction.

Conclusion

It was concluded that Tazarotene 0.1% cream is more effective in treating atrophic acne scars than the combination of Adapalene 0.3% and Benzoyl Peroxide 2.5%. Patients treated with Tazarotene showed a more significant reduction in scar severity, higher satisfaction levels, and a trend toward fewer side effects, suggesting a more favorable safety profile. Although the difference in quality of life between the two treatments was not statistically significant, the overall findings indicate that Tazarotene 0.1% cream may be a more effective and well-tolerated option for managing atrophic acne scars.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

It is approved by the department concerned. (IRBEC-IEHD-98/22)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

FASIHA MUSHTAQ (Post graduate resident FCPS)

Data Analysis

MOHAMMAD RIAZ KHAN (Assistant Professor)

Revisiting Critically

MARIA SALEEM (Assistant Professor)

Final Approval of version

ANUM KHAN (Senior Registrar)

Drafting

SARA AMIN (Postgraduate resident FCPS) & IQRA MUSHTAQ (FCPS)

Concept & Design of Study

References

1. Ak M. A comprehensive review of acne vulgaris. *J Clin Pharm.* 2019;1(1):17-45.
2. Brown B, McKenna S, Siddhi K, McGrouther D, Bayat A. The hidden cost of skin scars: quality of life after skin scarring. *Journal of Plastic, Reconstructive & Aesthetic Surgery.* 2008;61(9):1049-58.
3. Nandy P, Shrivastava T. Exploring the multifaceted impact of acne on quality of life and well-being. *Cureus.* 2024;16(1).
4. Leung AK, Barankin B, Lam JM, Leong KF, Hon KL. *Dermatology: how to manage acne vulgaris. Drugs in context.* 2021;10.
5. Afra T, Razmi M, Narang T, Dogra S, Kumar A. Topical tazarotene gel, 0.1%, as a novel treatment approach for atrophic post acne scars: a randomized active-controlled clinical trial. *JAMA facial plastic surgery.* 2019;21(2):125-32.
6. Ghodsi SZ, Orawa H, Zouboulis CC. Prevalence, severity, and severity risk factors of acne in high school pupils: a community-based study. *Journal of Investigative Dermatology.* 2009;129(9):2136-41.
7. Nouri K, Ballard CJ. Laser therapy for acne. *Clinics in dermatology.* 2006;24(1):26-32.
8. Nurjanti L. The Role of Immunological Reaction and Pro-Inflammatory Mediators in Acne Vulgaris Etiopathogenesis, Applications in Dermatology Practice. *International Journal of Clinical & Experimental Dermatology.* 2019;4(1):1-44.
9. Fife D. Practical evaluation and management of atrophic acne scars: tips for the general dermatologist. *The Journal of clinical and aesthetic dermatology.* 2011;4(8):50.
10. Gozali MV, Zhou B. Effective treatments of atrophic acne scars. *The Journal of clinical and aesthetic dermatology.* 2015;8(5):33.
11. Galindo SK, Spillman TL, Zuckerman DM. The Pathophysiology and Etiology of Acne Vulgaris and the Pharmacology of Treatments. *Bios.* 2024;95(1):52-8.
12. Fabbrocini G, Annunziata MC, D' Arco V, De Vita V, Lodi G, Mauriello M, et al. Acne scars: pathogenesis, classification and treatment. *Dermatology research and practice.* 2010;2010(1):893080.
13. Goodman GJ. Management of post-acne scarring: what are the options for treatment? *American journal of clinical dermatology.* 2000;1:3-17.
14. Swathi D, Aithal S. A Study of Psychological Impact of Acne Vulgaris on Quality of Life Using CADI & DLQI Scoring in Patients Attending Dermatology OPD in Tertiary Care Hospital: Rajiv Gandhi University of Health Sciences (India); 2018.
15. Waibel JS, Waibel H, Sedaghat E. Scar Therapy of Skin. *Facial Plastic Surgery Clinics of North America.* 2023;31(4):453-62.
16. Fisher GJ, Datta S, Wang Z, Li X-Y, Quan T, Chung JH, et al. c-Jun-dependent inhibition of cutaneous procollagen transcription following ultraviolet irradiation is reversed by all-trans retinoic acid. *The Journal of Clinical Investigation.* 2000;106(5):663-70.
17. Dreno B, Tan J, Rivier M, Martel P, Bissonnette R. Adapalene 0.1%/benzoyl peroxide 2.5% gel reduces the risk of atrophic scar formation in moderate inflammatory acne: a split-face randomized controlled trial. *Journal of the European Academy of Dermatology and Venerology.* 2017;31(4):737-42.
18. Loss MJ, Leung S, Chien A, Kerrouche N, Fischer AH, Kang S. Adapalene 0.3% gel effectively treats atrophic acne scars. *Dermatology and therapy.* 2018;8:245-57.
19. Kubba R, Layton A, Miyachi Y, Perez M, Martin JP, Ramos-e-Silva M, et al. New insights into the management of acne: An update from the Global Alliance to Improve Outcomes in Acne Group.



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution, and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license unless indicated otherwise in a credit line to the material. Suppose material is not included in the article's Creative Commons license and your intended use is prohibited by statutory regulation or exceeds the permitted use. In that case, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>. © The Author(s) 2024