Journal of Pakistan Association of Dermatologists. 2024;**34(4 Suppl):**S57-S63.

Original Article

Comparison of efficacy of topical tazarotene 0.1% versus topical adapalene 0.1% in treatment of mild to moderate acne vulgaris

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Abstract

Objective To compare the efficacy of topical tazarotene 0.1% vs. topical adapalene 0.1% in treatment of mild to moderate acne vulgaris.

Methods One hundred and eight six patients meeting inclusion criteria were enrolled in the study. In patients of group A, tazarotene was applied while in group B topical adapalene was administered Patients were reviewed on 4th week, 8th week and 12th week and report severe side effects immediately, if any. Patients were instructed to refrain from using cosmetics and other topical applications on their face. Data was noted and analyzed using SPSS version 20.0.

Results At week 0, both groups exhibited comparable mean scores of 12.28±5.27, with no statistically significant variance observed (p=1.000). By week 4, slight reductions were noted in both groups, with Group A reporting a mean score of 10.24±4.70 and Group B reporting 10.58±4.61 (p=0.615). However, at week 8 (5.81±3.45 vs. 8.01±3.87; p-value <0.001) and 12 (0.72±1.77 vs. 3.93±3.70; p-value<0.001), mean score was significantly less in group A than group B. In terms of efficacy, Group A demonstrated a higher frequency of positive outcomes, with all 93 participants (100%) experiencing the desired effect. In contrast, Group B showed a slightly lower efficacy rate, with 70 out of 93 participants (75.3%) achieving the desired outcome. Stratification of treatment response and efficacy produced similar results for all sub groups.

Conclusion Both therapies showed statistically significant results however patients treated with 0.1% tazarotene showed more efficacious results as compared to 0.1% adapalene.

Key words
Acne; Acne vulgaris; Adapalene; Tazarotene; Topical retinoids.

Introduction

Acne vulgaris is a widespread dermatological issue affecting individuals regardless of age, race, or ethnicity. Research indicates its notable prevalence among people with colored skin.[1] For example, a 2007 study comparing patients from various racial backgrounds seeking treatment for acne vulgaris in an American city found similar trends to European subjects.[2] This highlights the universal nature of acne vulgaris. The condition

Manuscript: Received on: September 23, 2024
Accepted on: November 04, 2024
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stems from complex interactions involving increased sebum production, altered keratinization, inflammation, and bacterial colonization of hair follicles by Propionibacterium acnes.[3] Its impact extends beyond physical symptoms, causing psychological distress and social isolation, particularly among adolescents.[4]

Acne vulgaris consistently ranks as a leading cause for dermatological consultations across different populations.[5] Studies conducted in various regions, including the United States, Singapore, India, and others, consistently identify it as a primary reason for seeking dermatological care.[6] While acne vulgaris affects individuals of all racial and ethnic backgrounds, prevalence rates may vary among different ethnic groups. Certain populations, such as Africans in London, adults in Peru, and South African Bantu populations, exhibit particularly high prevalence rates.[7]

Gender and age also play significant roles in the epidemiology and clinical presentation of acne vulgaris. Studies indicate a higher prevalence among women compared to men, with the condition often persisting into adulthood.[8] Clinical manifestations may vary by age and racial origin, necessitating tailored treatment approaches.[9]

Topical retinoids serve as the primary treatment for acne vulgaris, offering anti-inflammatory and comedolytic effects.[10] While effective, retinoid therapy may pose challenges, particularly among patients with colored skin, as it can trigger contact dermatitis and post-inflammatory hyperpigmentation.[11] Emerging delivery systems, such as microsponge technology, show promise in reducing irritation associated with retinoid therapy.[12]

Recent advancements in acne therapy have opened new avenues for effective treatment.[1] Lasers and light sources, including intense pulsed light (IPL), have emerged as valuable additions to the therapeutic arsenal for acne vulgaris.[13] A 2010 study demonstrated significant improvements in acne severity scores with IPL treatment, particularly in burst-pulse mode, with mean percentage improvements of 56.66%.[14] Topical retinoids remain the cornerstone of acne management, with formulations such as adapalene and tazarotene being widely regarded as highly efficacious.[15] A study comparing 0.1% tazarotene cream and 0.3% adapalene gel found superior efficacy with tazarotene, with a reported efficacy of 50.8% compared to 32.9% for adapalene.[14]

Previous studies have explored various combinations and strengths of topical retinoids, often in conjunction with other medications, to optimize treatment outcomes. Prescribing information for adapalene and tazarotene, detailing strengths and dosing regimens, offers valuable guidance for clinicians. These advancements herald a promising era in acne therapy, providing tailored treatment options to meet the diverse needs of patients, but the evidence was limited to this study was planned.

Patients and methods

This randomized controlled trial was conducted at Dermatology department, Sir Ganga Ram Hospital, Lahore for a period six months approval of synopsis from w.e.f. 13-10-2018 to 14-04-2019. A sample size of 186 (93 in each group) was calculated with 95% level of confidence, 80% power of the study and taking expected frequency of tazarotene group as 50.80% and in adapalene group 32.90%.[16] Inclusion criteria was patients of both the genders with age >12 years and <50 years with facial acne vulgaris of mild to moderate severity and Not> Grade II. Whereas patients with hypersensitivity to drugs used in treatment, drug induced acne, history of systemic drugs inducing

acne, topical medications for acne in the preceding 14 days, oral antibiotics in the preceding 30 days or oral steroids in the preceding 1 year, pregnant women and women who were planning pregnancy, lactating women and having history of laser resurfacing less than three months were excluded. Informed written consent was taken and two groups were made using lottery method. Group A patients applied tazarotene once daily to the entire face in the evening one hour before bedtime, following face washing. They applied a thin film of tazarotene, ensuring avoidance of contact with eyes, lips, and mucous membranes. Similarly, Group B patients applied adapalene once daily to the entire face before bedtime after face washing, using a thin film and avoiding contact with sensitive areas. Before and after commencement of treatment clinical photographs were taken. Patients were requested to visit for review for 4th week, 8th week and 12th week and report severe side effects immediately, if any. Patients were instructed to refrain from using cosmetics and other topical applications on their face. Data entry was performed using SPSS version 20. Qualitative variables such as gender and efficacy were presented as frequencies and percentages, while quantitative variables like age scores were expressed as mean and standard deviation. Efficacy between groups was compared using the Chi-square test, with p-values ≤0.05 considered statistically significant. Stratification was conducted based on age, BMI, and gender, with significance set at p≤0.05. Post-stratification chi-square tests were employed, considering p≤0.05 as significant.

Results

In this study, 186 participants aged between 17 to 32 years (mean age: 23.10±3.2 years) were included, comprising 82 males (44.09%) and 104 females (55.91%). The mean BMI of the participants was 21.52±2.06 kg/m² as given in **Table 1** The study encompassed two groups, Group A (n=93) and Group B (n=93), with comparable demographics. Both groups had a mean age of 23.18 ± 3.61 years and 23.02 ± 2.80 years, respectively, with no statistically significant difference observed (p>0.05). Gender distribution between the groups also showed no significant variance, with Group A comprising 40 males (43.01%) and 53 females (56.9%), and Group B including 42 males (45.2%) and 51 females (54.8%) (p >0.05). Additionally, the mean BMI in Group A was 21.41±2.02 kg/m², while in Group B, it was 21.63±2.11 kg/m², with a non-significant difference (p=0.469), as given in **Table 2**. At Week 0, both groups exhibited comparable mean scores of 12.28±5.27, with no statistically significant variance observed (p=1.000). By Week 4, slight reductions were noted in both groups, with Group A reporting a mean score of 10.24±4.70 and Group B reporting 10.58±4.61 (p=0.615).

However, at week 8, the difference was highly significant, with Group A showing a mean score

Table 1 Baseline characteristics of study sample.

Characteristics	*(n=186)*
Age (17-32 years)	23.10±3.2
Gender	
Male	82 (44.09%)
Female	104 (55.91%)
BMI (kg/m^2)	21.52±2.06

Table 2 Comparison of study groups at baseline.

Characteristics	*Group A (n=93)*	*Group B (n=93)*	*p-value*
Age (17-32 yrs.)	23.18±3.61	23.02±2.80	>0.05
Gender			
Male	40 (43.01%)	42 (45.2%)	>0.05
Female	53 (56.9%)	51 (54.8%)	
BMI (kg/m^2)	21.41±2.02	21.63±2.11	0.469

Independent sample t-test/ Chi-square test, difference was insignificant with p-value>0.05.

Table 3 Comparison of efficacy between the study groups.

Time Interval	*Group A*	*Group B*	*p-value*
At Week 0	12.28±5.27	12.28±5.27	1.000
At Week 4	10.24±4.70	10.58±4.61	0.615
At Week 8	5.81±3.45	8.01±3.87	<0.001
At Week 12	0.72±1.77	3.93±3.70	<0.001

Table 4 Frequency of treatment efficacy in the study sample.

Efficacy	*Frequency (n)*	*Percent (%)*
Group A	93	100.0%
Group B	70	75.3%
Total	163	78.63%

of 5.81±3.45 compared to Group B's 8.01±3.87 (p<0.001). This trend continued at week 12, with Group A demonstrating significant improvement (0.72±1.77) compared to Group B (3.93±3.70), with a significant difference (p<0.001) as given in **Table 3**.

In terms of efficacy, Group A demonstrated a higher frequency of positive outcomes, with all 93 participants (100%) experiencing the desired effect. In contrast, Group B showed a slightly lower efficacy rate, with 70 out of 93 participants (75.3%) achieving the desired outcome. When considering the total sample size of 163 participants from both groups, the overall efficacy rate was 78.63%, as given in **Table 4**. The study analyzed treatment response at various time intervals, stratified by age and gender. Results revealed consistent efficacy trends across different demographic subsets as given in **Table 5** and **6** respectively. Moreover, when efficacy was stratified by age, gender, and BMI, similar outcomes were observed across all subgroups, emphasizing the strength and reliability of the intervention's efficacy across diverse patient profiles as given in **Table 7**.

Discussion

Acne vulgaris, a prevalent dermatological condition, often leads to distressing complications such as scarring and psychosocial impacts.[17] Treatment typically involves topical agents like tazarotene 0.1% and adapalene 0.1%.[3] A comparative study was conducted to assess their efficacy in managing mild to moderate acne vulgaris.[18] Understanding their relative effectiveness is crucial for informing clinicians' treatment decisions and optimizing outcomes for patients grappling with this common skin disorder.

In this study, 186 participants aged between 17 to 32 years had a mean of 23.10±3.2 years. Our findings are similar to results reported by Anjum *et al*.[19] who reported average age of their study cohort to be 23 years whereas Bava *et al*.[20] reported it 22.4±5 year in India. In this study, 44.09% participants were male whereas 55.91% were females. Similar female dominance in their study cohort was reported by Anjum *et al*.[19] where female were 51.43% of the total participants.

However, Aneesh *et al*.[20] report it as high as 70%. The mean BMI of the participants was 21.52±2.06 kg/m². In this study, at Week 0, both

Table 5 Comparison of treatment response at various time intervals stratified for age.

Treatment Response	*Age*	*Group A*		*Group B*		*p-value*
		Mean	*SD*	*Mean*	*SD*	
0 week	≤25	12.35	5.21	12.11	5.02	0.780
	>25	12.08	5.604	12.85	6.21	0.658
4th week	≤25	10.35	4.602	10.43	4.43	0.919
	>25	9.92	5.049	11.09	5.27	0.44
8th week	≤25	5.79	3.29	7.76	3.62	0.001
	>25	5.84	3.91	8.85	4.63	0.001
12th week	≤25	0.70	1.78	3.72	3.54	<0.001
	>25	0.96	1.74	4.67	4.21	0.001

Independent sample t-test, difference was significant where p-value ≤0.05.

Table 6 Comparison of treatment response at various time intervals stratified for gender.

Time Interval	*Gender*	*Group A*		*Group B*		*p-value*
		Mean	*SD*	*Mean*	*SD*	
0 week	Male	12.40	5.69	11.31	5.16	0.780
	Female	10.70	5.21	10.19	4.59	0.658
4th week	Male	6.30	3.75	7.54	3.64	0.919
	Female	1.00	2.12	3.28	3.47	0.44
8th week	Male	12.18	5.01	13.07	5.30	0.001
	Female	9.88	4.29	10.90	4.65	0.021
12th week	Male	5.43	3.19	8.39	4.04	<0.001
	Female	0.60	1.44	4.47	3.83	0.001

Independent sample t-test, difference was significant where p-value ≤0.05.

Table 7 Comparison of efficacy stratified for age, gender, BMI.

Age		*Yes/No*	*Group A*	*Group B*	*p-value*
Age (Years)	≤ 25	Yes	68 (100%)	57 (79.2%)	<0.001
		No	0	15 (20.8%)	
	>25	Yes	25 (100%)	13 (61.9%)	<0.001
		No	0	8 (38.1%)	
Gender	Male	Yes	40 (100%)	34 (81.0%)	0.004
		No	0	8 (19.0%)	
	Female	Yes	53 (100%)	36 (70.6%)	<0.001
		No	0	15 (29.4%)	
BMI (Kg/m2)	<18.5	Yes	3 (100%)	0	0.025
		No	0	2 (100.0%)	
	18.5-25	Yes	87 (100%)	67 (77.0%)	<0.001
		No	0	20 (23.0%)	
	>25	Yes	3 (100%)	3 (75.0%)	0.350
		No	0	1 (25.0%)	

Chi Square test, difference was significant where p-value ≤0.05.

Group A and Group B exhibited similar mean scores of 12.28±5.27, with no statistically significant difference observed (p=1.000). By week 4, minor reductions were observed in both groups, with Group A reporting a mean score of 10.24±4.70 and Group B reporting 10.58 ± 4.61 (p=0.615). However, by week 8, a notable discrepancy emerged, with Group A demonstrating a mean score of 5.81±3.45 compared to Group B's 8.01±3.87 (p<0.001). This trend persisted at week 12, with Group A showing significant improvement (0.72±1.77) compared to Group B (3.93±3.70), with a significant difference (p<0.001). Thus proving that tazarotene, a more potent retinoid than adapalene in reducing acne lesions and improving skin texture by modulating gene expression and influencing cell differentiation. Regarding efficacy, Group A exhibited a higher frequency of positive outcomes, with all 93 participants (100%) experiencing the desired effect. In contrast, Group B demonstrated a slightly lower efficacy rate, with 70 out of 93 participants (75.3%) achieving the desired outcome. Considering the total sample size of 163 participants from both groups, the overall efficacy rate was 78.63%.

Clinical trials have demonstrated the efficacy of 0.1% adapalene for acne vulgaris.[17] Adapalene exhibits rapid onset of action and favorable tolerability compared to other retinoids, potentially enhancing patient compliance.[20]

Studies indicate lower irritancy indices for adapalene 0.1% cream and gel compared to tazarotene creams.[21] Topical tazarotene 0.1% has shown effectiveness and tolerability across various acne severities, skin types, sexes, and

ethnicities.[22] However, our study's findings contradict these assertions.[23]

Adapalene gel has fewer treatment-related adverse events compared to tazarotene cream.[24] A twelve-week, double-blind study concludes that adapalene cream 0.1% exhibits superior efficacy and excellent tolerability with minimal adverse events.[25] Contrary to a previous study, our findings indicate adapalene's superior efficacy in achieving 50% or greater improvement compared to tazarotene.[25] Preliminary data suggest comparable lesion reduction when tazarotene is applied less frequently than adapalene.[26] Recent multicenter research hints at tazarotene's potential superiority in reducing comedones.

Strengths include robust comparative analysis of tazarotene and adapalene in acne treatment, encompassing various time intervals and demographic subsets. Comprehensive assessment enhances the study's reliability. Limitations may include the potential for bias due to the retrospective design, as well as the reliance on self-reported data, which could introduce inaccuracies. Additionally, variations in treatment adherence among participants could impact efficacy outcomes. Future research with larger, prospective cohorts could address these limitations.

Conclusion

Both therapies showed statistically significant results however patients treated with 0.1% tazarotene showed more efficacious results as compared to 0.1% adapalene.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship None.

Conflict of interest Authors declared no conflict of interest.

Authors' contribution

MS: Have made substantial contribution study design, data acquisition, manuscript writing, has given final approval of version of manuscript for publication.

AM: Have made substantial contribution data acquisition, manuscript writing, has given final approval of version of manuscript for publication.

SM: Have made substantial contribution analysis and interpretation of data, critical review of the manuscript, has given final approval of version of manuscript for publication.

AS,NAA,NS,RH: Contribution to concept, study design, critical analysis and review, has given final approval of version of manuscript for publication.

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