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Original Research Article

Drug utilization patterns and adherence in patients on systemic and topical medications for the treatment of acne vulgaris

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ABSTRACT

Background: Acne vulgaris is a chronic inflammatory condition of the pilosebaceous units, often causing psychosocial distress and posing a treatment challenge due to poor medication adherence. This study aimed to assess drug utilization patterns and adherence among acne vulgaris patients in a tertiary care teaching hospital.
Methods: A prospective cross-sectional study was conducted in the Dermatology Department, in collaboration with the Pharmacology Department, ESIC Medical College and Hospital, Faridabad. A total of 296 prescriptions were collected between November 2022 and July 2023. Patients aged 15–35 years with all grades of acne on treatment for at least six months were included; pregnant women and those with hypertension or diabetes were excluded. Drug use patterns and adherence were analyzed.
Results: Across 296 prescriptions, 852 drugs were prescribed (294 oral, 558 topical), averaging 2.87 drugs per prescription. Fixed-dose combinations were used in 210 cases, and polypharmacy was observed in 92.56% of prescriptions. Doxycycline (68.1%) was the most common oral drug, while salicylic acid + glycolic acid (47.6%) and clindamycin + retinoic acid (33.4%) were common topicals. Grade I acne predominated in topical-only users, while grade II was more common in those on combination therapy. Combination therapy showed better adherence (74 versus 67 days), improved clinical outcomes (lower IGA scores), stronger patient-doctor relationships (higher PDDR scores), and more favorable skin pH.
Conclusions: Combination therapy is commonly used for moderate acne and is associated with improved adherence, clinical outcomes, and patient engagement, highlighting the benefits of integrated treatment approaches.

Keywords: Acne vulgaris, Drug utilization, Medication adherence, Combination therapy, Polypharmacy

INTRODUCTION

Acne vulgaris, eighth most common disease globally, affecting approximately 9.4% of the global population.[1] Acne vulgaris is a chronic inflammatory condition of the pilosebaceous units, marked by the development of comedones, erythematous papules, pustules, and/or nodules (referred to as pseudocysts), often resulting in scarring.[2] Contrary to the widespread belief that acne is a transient issue primarily affecting adolescents, it often persists for several years in many patients.[3] Due to its persistent nature and the extended exposure of affected areas, acne is correlated with a significant decline in both the quality of life and overall well-being of patients.[4]

Many systemic and topical medications are available for the treatment of acne vulgaris. The choice should be based on, amongst others, patient age, sites and severity of the acne, efficacy, safety, and cost of the medication, and patient preference. As per the latest guidelines, the

utilization of diverse topical anti-acne treatments is advocated for addressing all grades of acne vulgaris. These therapies encompass benzoyl peroxide (BPO), azelaic acid, adapalene, a fixed combination of adapalene 0.1% and BPO 2.5% (A/BPO), a fixed combination of clindamycin and BPO, or a fixed combination of clindamycin 1.2% and tretinoin 0.025% gel (Clin-RA).[5] Despite the existence of viable treatment options, patients often exhibit poor adherence to their prescribed regimens, failing to consistently follow medication instructions on a day-to-day basis.[6]

Acne vulgaris profoundly affects quality of life, particularly concerning its emotional, social, and psychological ramifications. Acne vulgaris imposes substantial psychosocial challenges on patients, leading to issues such as diminished self-esteem, social anxiety, fear, negative self-image, and depression. Additionally, it can pose significant economic burdens on both patients and society at large.[7] Adherence to medication is pivotal for successful acne management, with non-adherence often cited as a primary cause of treatment failure. Medication adherence is defined as "the act of conforming to the recommendations made by the provider with respect to timing, dosage, and frequency of medication taking".[8] A positive correlation exists between medication adherence and the quality of life among patients dealing with acne.[9] Research findings indicate that adherence to acne medications ranges widely, from around 30% to 80%.[10]

The various treatment options available aim to reduce the non-inflammatory lesions, the existing inflammation, bacterial colonization and minimize complications. So, this study was undertaken to overview the current prescribing pattern of anti-acne drugs in different types of acne in a tertiary care teaching hospital. Limited data have been accessible regarding the correlation between adherence and quality of life. Hence, this study also aims to investigate drug utilization pattern used in acne vulgaris and medication adherence.

METHODS

Study design and methodology

This study was conducted in the Dermatology out-patient department (OPD) and in-patient department (IPD), along with the Department of Pharmacology at ESIC Medical College and Hospital, Faridabad. It was carried out in collaboration with the Department of Pharmacology at Al-Falah School of Medical Sciences and Research Center, Haryana, and SRMS Institute of Medical Sciences (IMS), Bareilly. Ethical approval was obtained from the Institutional Ethics Committee, and informed consent was secured from all participants prior to data collection.

The study followed a prospective cross-sectional design and was conducted over nine months, from November 2022 to July 2023. A total of 296 prescriptions were collected based on predefined inclusion and exclusion criteria. A structured proforma was designed to systematically compile and analyze the data.

Study population

The study included patients diagnosed with all grades of acne vulgaris, aged 15 to 35 years, irrespective of gender, who had been undergoing systemic and/or topical acne treatment for at least six months. However, pregnant women and individuals with comorbid conditions such as hypertension and diabetes were excluded to maintain homogeneity in the study sample.

Data collection and assessment

Various patient characteristics, including age, sex, education level, acne severity (grade), treatment satisfaction, and medication adherence, were documented. The quality of prescriptions was evaluated using standard prescribing indicators.

To assess treatment adherence and clinical outcomes, the following parameters were measured.

Investigator's global assessment score

It was used to determine acne severity, ranging from 0 (clear) to 4 (severe).

Cardiff acne disability index

It evaluated the impact of acne on patients' quality of life, with scores ranging from 0 to 15. A higher score indicated greater psychosocial distress.

Skin pH levels

It measured to analyze any alterations in the skin's physiological environment due to treatment.

Patient-doctor depth-of-relationship scale

A questionnaire comprising 43 elements evaluating knowledge, trust, loyalty, and regard in the patient-doctor relationship.

Statistical analysis

Categorical variables were compared using the Chi-square test or Fisher's exact test, while normally distributed continuous variables were analyzed using the student t-test. For non-normally distributed data, the Mann-Whitney U test was employed. A p value <0.05 was considered statistically significant for all comparisons.

The collected data were subjected to epidemiological analysis using statistical package for the social sciences (SPSS) for Windows statistical software.

RESULTS

A total of 296 prescriptions were analyzed in this study (Table 1). From these, 852 drugs were prescribed in total. Among them, 294 drugs were administered through the oral route, while 558 drugs were prescribed via the topical route. The average number of drugs per prescription was 2.878, indicating a tendency toward polypharmacy. Furthermore, 210 fixed-dose combinations (FDCs) were used among the prescribed drugs.

Table 1: Analysis of prescriptions.

Parameters	Frequency
No. of prescriptions	296
Total no. of drugs prescribed	852
Total no. of drugs prescribed through oral route	294
Total no. of drugs prescribed through topical route	558
Average no. of drugs prescribed per prescription	2.878
No. of FDCs	210

Out of the 296 prescriptions analyzed, polypharmacy was observed in 274 cases (92.56%), while monotherapy was prescribed in 22 cases (7.43%), as shown in Table 2.

Table 2: Types of prescription.

Types of prescription	No. of prescription (%)
Monotherapy	22 (7.43)
Polytherapy	274 (92.56)

Out of the total 296 prescriptions analysed, a wide range of topical and oral medications were prescribed for the treatment of acne vulgaris, as detailed in Table 3. Among the oral medications, doxycycline was the most frequently prescribed drug (205 prescriptions, 69.7%), followed by isotretinoin (77, 26.1%) and minocycline (12, 4.08%). For topical medications, the most commonly used were salicylic acid + glycolic acid (171, 31%) and clindamycin + retinoic acid (109, 19.5%), followed by benzoyl peroxide (88, 15.7%), azelaic acid (67, 12%), clindamycin + adapalene (55, 9.8%), clindamycin + BPO (41, 7.3%), and BPO + adapalene (25, 4.4%).

The baseline characteristics of the study participants (n=296) are summarized in Table 4. The median age was 20 years (IQR: 18–22) in the topical group (n=181) and 21 years (IQR: 18–24) in the topical + oral combination group (n=115), indicating a comparable age distribution. In terms of gender, the topical group comprised 65 males (35.9%) and 116 females (64.1%), while the combination group had 41 males (35.7%) and 74 females (64.3%).

Acne severity varied between groups: grade I acne was more common in the topical group (102 patients, 56.3%), whereas grade II acne predominated in the combination group (69 patients, 60%). Grade III acne was also more frequent in the combination group (26.9%) compared to the topical group (11.6%), and no patients in either group presented with grade IV acne.

Table 3: Categories of drugs used in acne vulgaris.

Topical medications	Number (%)	Oral medications	Number (%)
BPO	88 (15.7)	Isotretinoin	77 (26.1)
Azelaic acid	67 (12)	Doxycycline	205 (69.7)
CLIN + RA	109 (19.5)	Minocycline	12 (4.08)
CLIN + ADA	55 (9.8)		
CLIN + BPO	41 (7.3)		
BPO + ADA	25 (4.4)		
Salicylic acid + glycolic acid	173 (31)		

BPO: Benzoyl peroxide, CLIN: clindamycin, RA: retinoic acid, ADA: adapalene

Regarding educational status, most patients in both groups had completed high school (99 [54.7%] in the topical group; 61 [53%] in the combination group), followed by university-level education (46 [25.4%] and 18 [15.7%], respectively). A smaller proportion had middle or elementary school education, and no participants were uneducated. These findings reflect a relatively well-educated study population.

Table 5 presents the patient and treatment-related characteristics of the study population (N=296). The median number of adherence days was 67 (IQR: 53–75) in the topical group (n=181) and 74 (IQR: 64–84) in the topical + oral combination group (n=115), with the difference being statistically significant (p=0.013).

The proportion of patients who remained on active treatment was significantly higher in the topical group, with 167 patients (92.3%) compared to 91 patients (79.1%) in the combination group (p=0.0018). As for reasons for discontinuation, 101 patients (55.8%) in the topical group and 76 patients (66.1%) in the combination group stopped treatment due to controlled acne. Discontinuation due to side effects was reported in 21 patients (11.6%) and 10 patients (8.7%), respectively, while 59 (32.6%) and 29 (25.2%) discontinued due to perceived ineffectiveness (all p>0.05).

Investigator's global assessment (IGA) scores showed a statistically significant difference between groups (p=0.0009). In the topical group, 2 (1.1%) had a score of 0 (clear), 21 (11.6%) had score 1, 112 (61.9%) had score 2, 48 (26.5%) had score 3, and 1 (0.6%) had score 4. In contrast, the combination group had 8 (7.0%) with score 0, 23 (20.0%) with score 1, 71 (61.7%) with score 2, 13 (11.3%) with score 3, and 1 (0.9%) with score 4. The median Cardiff acne disability index (CADI) score was 7

(IQR: 5-9) in the topical group and 3 (IQR: 2–4) in the combination group (p<0.0001), indicating greater quality of life impairment in the topical group. The patient–doctor depth-of-relationship scale (PDDRS) score was higher in the combination group [4 (IQR: 3–5)] than in the topical group [3 (IQR: 2–4)] (p<0.0001), reflecting a better patient–physician rapport. Skin pH was slightly higher in the topical group [5.4 (IQR: 5.3–5.5)] compared to the combination group [5.2 (IQR: 5.1–5.3)] (p<0.0001).

Table 4: Patient's characteristics at the time of data collection.

Characteristics	Topical (n=181) (%)	Topical + oral combination (n=115) (%)
Age (years)	20 (18–22)	21 (18–24)
Male	65 (35.9)	41 (35.7)
Female	116 (64.1)	74 (64.3)
Grades of acne		
I	102 (56.3)	15 (13)
II	58 (32)	69 (60)
III	21 (11.6)	31 (26.9)
IV	0 (0)	0 (0)
Education		
University	46 (25.4)	18 (15.7)
High school	99 (54.7)	61 (53)
Middle school	25 (13.8)	21 (18.3)
Elementary school	11 (6.1)	15 (13)
No education	0 (0)	0 (0)

Values are expressed as number (%). Age is presented as median (interquartile range). Percentages are calculated based on the group total (n=181 for topical, n=115 for topical + oral combination)

Table 5: Patient and treatment characteristics at the time of data collection.

Characteristics	Topical (n=181)	Topical + oral combination (n=115)	P value
Adherence days	67 (53 to 75)	74 (64 to 84)	0.013
Active, N (%)	167 (92.3)	91 (79.1)	0.00184
Reasons for discontinuation of treatment, n (%)			
Controlled acne	101 (55.8)	76 (66.1)	0.102
Side effects	21 (11.6)	10 (8.7)	0.478
Ineffectiveness	59 (32.6)	29 (25.2)	0.197
IGA, n (%)			0.0009
Score 0	2 (1.1)	8 (7.0)	
Score 1	21 (11.6)	23 (20.0)	
Score 2	112 (61.9)	71 (61.7)	
Score 3	48 (26.5)	13 (11.3)	
Score 4	1 (0.6)	1 (0.9)	
CADI score	7 (5-9)	3 (2-4)	0.00001
PDDRS scale	3 (2-4)	4 (3-5)	0.00001
Skin pH	5.4 (5.3 to 5.5)	5.2 (5.1 to 5.3)	0.00001

Values in parentheses following adherence days, CADI score, PDDRS scale, and skin pH represent the interquartile range (IQR). Values in parentheses following counts represent percentages. IGA=Investigator's global assessment; CADI=Cardiff acne disability index; PDDRS=patient–doctor depth-of-relationship scale. Chi-square test – for comparison of categorical variables (e.g., IGA scores, reasons for discontinuation, active cases). Mann–Whitney U test – for comparison of non-normally distributed continuous variables (e.g., adherence days, CADI score, PDDRS scale, and skin pH)

DISCUSSION

Topical medications are widely used for managing chronic skin diseases, offering the advantage of delivering potent treatments while minimizing the risk of systemic side effects.[11] Unfortunately, using topical medications is more complex and time-consuming compared to oral treatments. The disparity between oral and topical medication drug utilization pattern and adherence is demonstrated in the study.[12]

In this study, the topical group comprised 65 males (35.9%) and 116 females (64.1%), while the combination group had 41 males (35.7%) and 74 females (64.3%); (Table 4) consistent with findings from other studies that indicate acne is more prevalent in females. The majority of patients in the topical group had grade I acne (56.3%), consistent with findings from previous studies.[13,14] However, 60% of patients in the topical + oral group had grade II acne, which contrasts with previous studies,

indicating that combination therapy is more frequently used for treating higher grades of acne.[14]

The statistical analysis revealed a significant difference in both adherence days and active disease proportions between the topical and topical + oral combination groups (Table 5). The observed differences in adherence days and active disease proportions between the topical and topical + oral combination groups align with findings from other studies. For instance, a meta-analysis of 221 clinical trials found that triple-combination therapies incorporating a topical or oral antibiotic, topical retinoid, and benzoyl peroxide were consistently more efficacious than two-product combinations or topical monotherapy.[15] Therefore, combining oral and topical therapies might improve adherence and treatment outcomes, as the oral component can provide systemic effects that complement the localized action of topical agents.

In the present study, treatment discontinuation in the topical group was primarily due to controlled acne (55.8%), side effects (11.6%), and ineffectiveness (32.6%), while in the topical + oral combination group, the rates were 66.1%, 8.7%, and 25.2% respectively (Table 5). The most commonly reported adverse effects leading to treatment cessation included dryness/irritation and eczema. These findings are comparable to a real-world adherence study which reported discontinuation due to ineffectiveness (52%), controlled acne (9%), and side effects (9%) after three months of treatment, although a significant portion (27%) of patients were lost to follow-up.[16] However, the values of controlled acne and treatment ineffectiveness were higher in both groups compared to typical findings in RCTs.[17] Despite these higher values, there was no statistically significant difference between the topical-only and the topical + oral groups in terms of discontinuation due to controlled acne, side effects, or ineffectiveness.

Oral and topical combination group (Table 5) has a higher proportion of patients with lower IGA scores (0 and 1), indicating better clinical improvement, while oral group has more patients with higher IGA scores (4), suggesting worse clinical outcomes. There is no significant difference in score 2 (mild), and score 4 (severe) is rare in both groups. These findings align with existing literature on combination therapy for acne treatment. A study by Dreno et al reported that oral and topical combination therapy led to a significantly higher proportion of patients achieving IGA scores of 0 or 1, indicating better clinical outcomes, compared to oral therapy alone.[18] Similarly, a review by Zaenglein et al highlighted that combination therapies enhance treatment efficacy by targeting multiple acne pathways, leading to superior clearance rates.[19]

This study found a significantly lower CADI score in the combination therapy group (3 [2-4]) compared to the topical group (7 (5-9)] indicating better quality of life in the combination group (Table 5). These findings align with studies by Dreno et al and Zaenglein et al which reported superior psychosocial outcomes with combination therapy over monotherapy.[18,19] A study highlighted that poor adherence to acne treatments can negatively impact treatment outcomes and, consequently, patients' quality of life.[20] Additionally, research has shown that effective acne management, which often depends on patient adherence, leads to significant improvements in health-related quality of life.

The significant improvement in PDDR scores observed in the combination therapy group underscores the critical role of effective communication and patient education in enhancing treatment adherence and outcomes in acne management (Table 5). This finding is consistent with the study by Donnarumma et al, which demonstrated that providing patients with both SMS reminders and visual instruction leaflets significantly improved adherence to topical acne treatments.[21]

The study highlighted those patients receiving combined educational interventions showed better compliance and clinical outcomes compared to those who did not receive such support. Both studies emphasize that fostering a strong patient-doctor relationship and utilizing multifaceted educational strategies are pivotal in promoting adherence and achieving optimal therapeutic results in acne care.

The significant reduction in skin pH (Table 5) observed in the combination therapy group aligns with existing literature emphasizing the benefits of maintaining an acidic skin environment. For instance, a study demonstrated that using a pH 4.0 emulsion significantly decreased skin pH over four weeks, while a pH 5.8 emulsion did not produce a similar effect.[22] This suggests that treatments promoting a lower skin pH can enhance skin barrier function and overall skin health.

This study underscores that combination therapy is preferred for higher grades of acne, leading to improved adherence, better clinical outcomes, enhanced patient-doctor relationships, and effective skin pH regulation. Combination therapy is associated with improved adherence, as reflected by increased adherence days, lower IGA scores, and higher efficacy in managing moderate-to-severe acne.

Strengths

One of the strengths of the study is its prospective cross-sectional design, utilizing patient prescriptions from the OPD instead of relying on retrospective data from case records, which is a more common but less rigorous method in prescription pattern studies.

Additionally, the prospective approach effectively prevents data duplication.

Limitations

This study has few limitations, including its single-centre design, relatively small sample size, exclusion of pregnant women and patients with comorbidities, potential recall

bias in adherence assessment, and lack of long-term follow-up to evaluate sustained treatment outcomes and relapse rates.

CONCLUSION

This study highlights that combination therapy is more frequently used for higher-grade acne, leading to improved adherence, better clinical outcomes, enhanced patient-doctor relationships, and effective skin pH regulation, while also demonstrating the advantages of integrating systemic and localized treatments for optimal therapeutic success.

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