

Original Research Article

The effect of topical retinoids in treatment of acne vulgaris in Khartoum Teaching Dermatological Hospital

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ABSTRACT

Background: Acne vulgaris is a chronic inflammatory skin disease affecting approximately 80% of young adults and adolescents. Prolonged therapy is often required for satisfactory results. Topical retinoids play a central role in acne treatment, with evidence supporting their efficacy in achieving significant improvements in acne symptoms. This study aimed to assess the effectiveness of topical retinoids in treating acne vulgaris among patients at Khartoum Dermatology and Venereal Teaching Hospital from August 2019 to August 2020.

Methods: A non-randomized interventional study was conducted at Khartoum Dermatology Teaching Hospital, covering patients diagnosed with mild to moderate acne vulgaris. Data were entered, cleaned, and analysed using statistical package for the social sciences (SPSS) version 25.0.

Results: The study included 100 patients. Of these, 38% were aged 25-35 years, and 70% were female. 92% had experienced acne symptoms for more than six months. Regarding treatment duration, 87% used topical retinoids for more than three months. Clinical improvement was observed in 83% of patients, while 14% showed no improvement, and 3% experienced worsened symptoms.

Conclusions: Topical retinoids are effective in treating mild and moderate acne vulgaris.

Keywords: Acne vulgaris, Topical retinoid, *Propionibacterium acnes*, Acne scarring

INTRODUCTION

Acne vulgaris is a chronic inflammatory disease of the skin. Approximately 80% of young adults and adolescents have acne vulgaris. Acne vulgaris is characterized by open and closed comedones and lesions with inflammatory nodules, pustules, and papules, which typically affect the face, chest, and back.^{1,2}

Acne vulgaris is a chronic disease that requires prolonged therapy for a satisfactory outcome. Treatment adherence in patients is a major problem, particularly for topical treatments, owing to side effects and the prolonged treatment time. Insufficient adherence leads to recurrence of acne, patient dissatisfaction, and increased medical costs.³

It is generally agreed that multiple molecular pathways are involved in acne, with four primary pathophysiologic mechanisms.⁴⁻⁶ Abnormal desquamation within the sebaceous follicles that leads to obstruction of the pilosebaceous canal, androgen-driven excess sebum production, proliferation within the follicle by *Propionibacterium acnes*, which generates pro-inflammatory stimuli and altered immune system activity.

Topical retinoids have a central role in acne therapy because they have been shown both to reduce visible lesions and inhibit the development of micro comedones and new lesions.^{7,8} Retinoids act to normalize desquamation by reducing keratinocyte proliferation and promoting differentiation.⁹ Topical retinoids also block several important inflammatory pathways that are

activated in acne: toll-like receptors, leukocyte migration, and the AP-1 pathway.^{9,10}

Dose-dependent effects on primary acne lesions

The efficacy of individual topical retinoids increases with increasing concentration. In two separate ultra-structural studies, 12 weeks of tretinoin therapy (0.1% and 0.025%) reduced micro comedones by 80% and 35%, respectively.^{8,11}

Effects on secondary acne lesions

In addition to affecting primary acne lesions, topical retinoids have also been shown to act on secondary lesions including scarring and pigmentation because of actions in the dermis. Acne scarring occurs because of dermal remodelling and an imbalance between matrix degradation and matrix synthesis that is orchestrated by matrix metalloproteinase's (MMPs).¹²

In pigmentary problems, topical retinoids lighten hyperpigmented lesions by inhibiting melanosome transfer to keratinocytes and reducing epidermal pigmentation by accelerating epidermal turnover.¹³

Efficacy in inflammatory acne

There is a common perception that retinoids should be reserved primarily for comedonal acne.¹⁴ Randomized controlled trials have provided strong evidence that topical retinoids as monotherapy significantly reduce inflammatory lesions, with an effect that is comparable to that on non-inflammatory lesions.¹⁵⁻¹⁷

METHODS

Study design

This was prospective, observational descriptive, analytical and cross-sectional hospital-based study.

Study area

The study was conducted at Khartoum Teaching Dermatology Venerology Hospital in Khartoum, Sudan.

Study duration

The study was conducted within the period from August 2019 to August 2020. The detailed schedule of different steps of the study shown on the coming parts of this document.

Study population

The study involved patients aged 15-45 years diagnosed with mild to moderate acne vulgaris. Those with severe nodulocystic or fulminant acne were excluded.

Inclusion and exclusion criteria

The inclusion criteria for the study consisted of adults aged 15 to 45 years who were diagnosed with mild to moderate acne vulgaris, had not received any prior medication, visited Khartoum Dermatology and Venereal Teaching Hospital during the study period, and agreed to participate in the study. Conversely, patients were excluded if they did not meet the inclusion criteria or if they had severe, nodulocystic, or fulminant acne.

Sample size and technique

Since this is non-randomized intervention study, I will select both male and female patients by using simple random and systemic random methods, the size of the study will be determined through the following formula.

Data collection tools/methods

Patients of acne vulgaris were selected according to diagnostic criteria of acne grading. The data was collected using comprehensive structural close ended questionnaire. All participants provided informed consent, and clinical examinations were conducted. Then questionnaire was filled through direct face to face interview.

Study variables

Dependant variables

The dependent variables in this study include the clinical features of patients before and after using topical retinoids, as well as demographic factors such as age, gender, and the duration of acne.

Independent variables

The independent variables in this study encompass patients' perceptions of topical retinoids, their level of education, and their place of residence.

Data entry, analysis and presentation

Data entry, analysis, and presentation involved entering, cleaning, and analysing the data using statistical package for the social sciences (SPSS) version 25.0. Descriptive statistics were presented in the form of frequency tables with percentages and graphs, while means and standard deviations were illustrated with relevant graphical representations for quantitative data. A p value of 0.05 or less was considered statistically significant. After analysis, the data was represented through univariate tables, cross-tabulations (bivariate tables), figures, and narrative descriptions.

Ethical considerations

Ethical considerations included obtaining written ethical clearance and approval from the Arab Board of Medical

Specialization Ethical Committee for conducting this research. Informed written consent was secured from all participants. The study data and information were used solely for research purposes, with privacy issues being carefully addressed. Additionally, written permission was obtained from the administrative authority of Khartoum Dermatology and Venereal Teaching Hospital. Participants were informed that they could withdraw from the study at any time without facing any negative consequences regarding their management.

RESULTS

This study is conducted among 100 patients diagnosed with acne vulgaris and have been interviewed in Khartoum Dermatology Teaching Hospital. 44 patients (44%) were in range 15-25 years in age (Table 1).

Table 1: Age distribution (n=100).

Age (in years)	No. of patients	Percent (%)
15-25	44	44.0
25-35	38	38.0
35-45	18	18.0
Total	100	100.0

Regarding gender male are 30 patients (30%) and female are 70 patients (70%) with male: female ratio 1:2.3. Based on educational level 86 patients (86%) are educated until secondary level and above. About the history of acne 54 patients (54%) have acne vulgaris for the first time and 46 patients (46%) have history of acne vulgaris (Figure 1). Regarding duration of acne vulgaris 8 patients (8%) their symptom started less than 6 months and 92 patients (92%) their symptoms started for more than 6 months (Table 2).

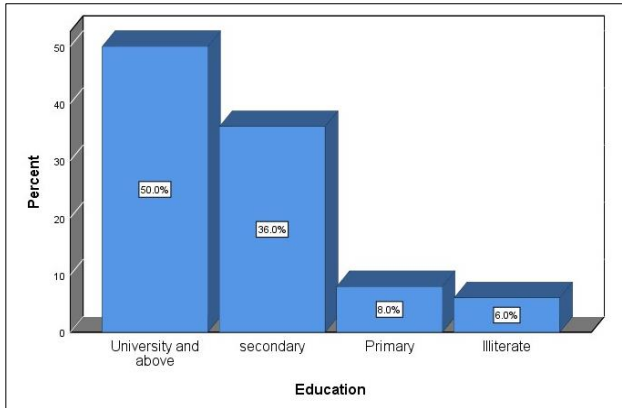


Figure 1: Participants education (n=100).

Concerning knowledge of the patients about topical retinoids 9 patients (9%) had background about topical retinoids and 91 patients (91%) have no background about topical retinoids (Table 3), about those who had knowledge about topical retinoids 6 patients (6%) had positive idea and 3 patients (3%) had negative idea (Figure 2).

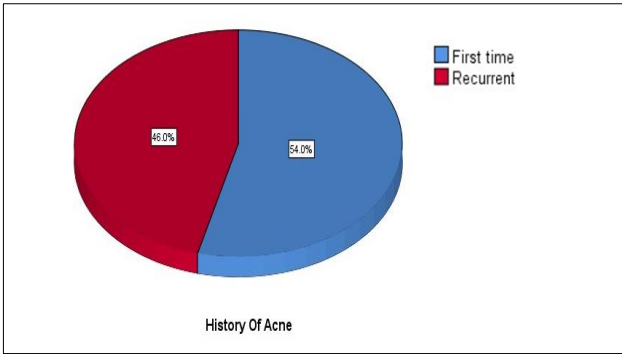


Figure 2: Past history (n=100).

Table 2: Duration of acne vulgaris in the study (n=100).

Duration of acne (months)	No. of patients	Percent (%)
<6	8	8.0
>6	92	92.0
Total	100	100.0

Table 3: Background of topical retinoids in the study (n=100).

Background of topical retinoid	No. of patients	Percent (%)
Yes	9	9.0
No	91	91.0
Total	100	100.0

Regarding of acne vulgaris 29 patients (29%) have mild acne vulgaris and 71 patients (71%) have moderate acne vulgaris.

Table 4: Duration of use of topical retinoids in the study (n=100).

Duration of use of topical retinoid (months)	Frequency	Percent (%)
<3	13	13.0
>3	87	87.0
Total	100	100.0

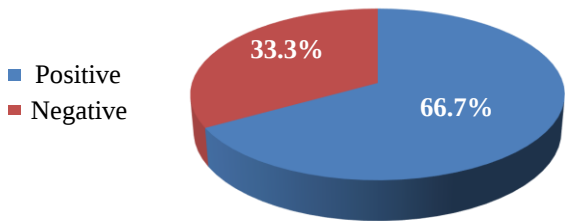


Figure 3: Patients who had knowledge about topical retinoid in the study (n=100).

Regarding our intervention by using topical retinoids 13 patients (13%) were used topical retinoid for less than 3 months and 87 patients (87%) were used topical retinoid for more than 3 months (Table 4).

Concerning the clinical assessment following use of topical retinoid 83 patients (83%) were improved, 14 patients (14%) were not improved and 3 patients representing (3%) were worsened (Figure 3).

Table 5: The commonest ages and gender affected with acne vulgaris in the study (n=100).

Gender	Age group (years)			Total
	15-25	25-35	35-45	
Male	21 (70.0)	9 (30.0)	0 (0.0)	30 (100.0)
Female	23 (32.9)	29 (41.4)	18 (25.7)	70 (100.0)
Total	44 (44.0)	38 (38.0)	18 (18.0)	100 (100.0)

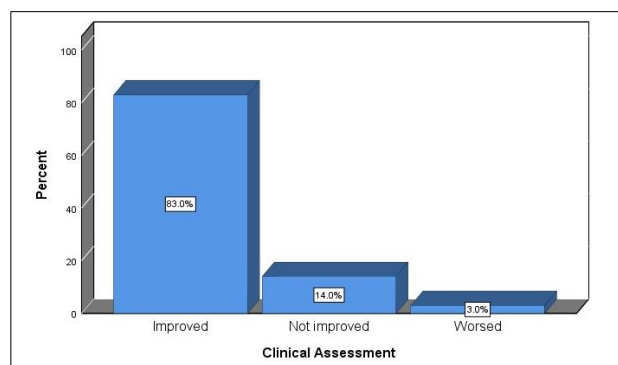


Figure 4: Clinical assessment following use of topical retinoid in the study (n=100).

Table 6: Correlation between duration of acne vulgaris and effect of topical retinoid in the study (n=100).

Duration of acne (months)	Clinical assessment			Total
	Improved	Not improved	Worsened	
<3	8 (100.0)	0 (0.0)	0 (0.0)	8 (100.0)
>3	75 (81.5)	14 (15.2)	3 (3.3)	92 (100.0)
Total	83 (83.0)	14 (14.0)	3 (3.0)	100 (100.0)

P value=0.410 not significant

The most common affected age with acne vulgaris is those in between 15-25 years old; 44 patients (44%) of total number of patients. And the most common affected gender is the female; 70 patients (70%) of total patient number (Table 5).

Furthermore, the analysis found no significant association between the duration of acne and effect of topical retinoid ($p=0.410$) (Table 6).

DISCUSSION

This study aimed to identify effect of topical retinoids in the treatment of acne vulgaris in Khartoum teaching dermatology hospital and covered 100 patients with acne vulgaris.

Regarding the gender, 70% were females and 30% were males. Different findings were reported in the study done by Leyden et al addressed topical retinoid in inflammatory acne.¹ In this study, each of the 5 investigators rated photographs of 577 patients (approximately 52% women, approximately 48% men.¹⁴ Moreover, Dikicier et al conducted study in turkey covered 250 people; stated that acne vulgaris affect 71.2% females and 28.8% male.³ This variation may be due to the care of female about their appearance more than male; so, they represent the common gender attending hospital seeking medical advice.

About the age groups at the time of diagnosis more than third of the study participants 44 patient representing (44%) were diagnosed with acne vulgaris at age between 15-25 years. Tan et al in Turkey, conducted study showed that the mean age 18.6 years.³ Leyden et al topical retinoids in inflammatory acne conducted a study on topical retinoids in inflammatory acne found that the mean age 18-20 years.¹⁴ So, that the commonest age range of patient presented with acne vulgaris was 15-25 years; this can be due to hormonal changes in this period. Most of patients; 83 patients representing 83% were from Khartoum and the rest 17 patient represent 17% were from other states of Sudan, this because geographical issue causes the study done in Khartoum hospital.

The study revealed that half of the patient 50 patient represent 50% were educated up to university and above and about one third 36 patients represent 36% were educated up to secondary school; I think that because the educated people are more aware about their health condition.

Most of the patients 92% had the symptoms for more than 6 months, this may be because many patients' cultures have concept of trying herbal products and they visit doctors late after failure of their trials.

Majority of the patients 87 represent 87% used topical retinoids for more than 3 months. Acne in adolescents, December 2017 conducted study showed that the most common reason for treatment failure is insufficient duration of therapy. Successful treatments require months of topical agents and, in many cases, additional systemic therapies.¹⁹ That why I explain to the patients the side effects and how to deal with it and I insist to continue in treatment and tolerate to reach the satisfied result.

This study did not found relation between duration of acne vulgaris and efficacy of topical retinoid ($p=0.410$). I did not find any paper discussed relation between duration of acne and efficacy of treatment.

The study revealed that the topical retinoids are effective in treatment of acne vulgaris; most patients were improved following use of topical retinoids 83 patient represent 83%, 14 patients represent 14% not improved and 3 patients represent 3% their condition worsen. Topical retinoids in inflammatory acne study showed that Each of the 5 investigators rated photographs of 577 patients (approximately 52% women, approximately 48% men; mean age, 18-20 years), for a total of 2885 evaluations (in addition to daily evaluations of the 20 control patients). The treatment groups consisted of tazarotene (252 patients, 1260 evaluations), adapalene (178 patients, 890 evaluations), tretinoin microsphere (47 patients, 235 evaluations), tretinoin gel (39 patients, 195 evaluations), and vehicle (61 patients, 305 evaluations). Inflammatory acne was improved with all 4 retinoids compared with vehicle.²⁰ Also, Kolli et al conducted a study which stated that topical retinoids are superior to vehicle in improving investigator global assessment and investigator's static global assessment (24.1-28.8% and 13.3-17.3%, respectively; $p<0.001$).²¹

Furthermore, Thielitz et al conducted a study which showed that all-topical retinoids are effective as single agents in mild to moderate acne but differ in efficacy and tolerability. Tazarotene 0.1% is more effective than tretinoin 0.025% or 0.1% microsphere gel or adapalene 0.1% gel or cream. Adapalene 0.1% is equally effective to tretinoin 0.025% or tretinoin microsphere 0.1% gel or tretinoin 0.05% cream or isotretinoin 0.05% gel. Adapalene 0.1% gel is significantly better tolerated than tazarotene 0.1% gel, tretinoin 0.025% and tretinoin 0.05% gel, tretinoin 0.05% cream, tretinoin microsphere 0.1% gel or isotretinoin 0.05% gel.²² Thus, topical retinoids are efficacious in treatment of acne vulgaris.

CONCLUSION

Based on the findings of the study, the most common gender affected with acne vulgaris are females 70 patient represent 70%, with male: female ratio 1: 2.3. The most common age group affected with acne vulgaris are those between 15-25 that represent 44%.

Regarding efficacy of topical retinoids, the study reported that (83%) of the patients were improved following use of topical retinoids, so topical retinoids are efficacious in treatment of acne vulgaris. In this study the relation between duration of acne vulgaris and effect of topical retinoid was found to be not significant ($p=0.410$).

Recommendations

As an outcome of this study, and to ensure effective treatment result, it is found important to raise awareness of

the patients about importance of the treatment, how to apply it, side effects and adherence to the treatment instruction. Also, a regular medical follows up is mandatory, to insure adherence to the effectiveness of the treatment.

Price and availability of topical retinoids should be considered, and to contact pharmaceutical companies to provide products with affordable prices. Further studies are deemed recommended to explore the efficacy of other modalities of treatment to reach satisfied results.

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REFERENCES

1. Gold MH, Baldwin H, Lin T. Management of comedonal acne vulgaris with fixed-combination topical therapy. *J Cosmet Dermatol*. 2018;17(2):227-31.
2. Strauss JS, Krowchuk DP, Leyden JJ, Lucky AW, Shalita AR, Siegfried EC, et al. Guidelines of care for acne vulgaris management. *J Am Acad Dermatol*. 2007;56(4):651-63.
3. Tan X, Al-Dabagh A, Davis SA, Lin HC, Balkrishnan R, Chang J, Feldman SR. Medication adherence, healthcare costs and utilization associated with acne drugs in Medicaid enrollees with acne vulgaris. *Am J Clin Dermatol*. 2013;14(3):243-51.
4. Thiboutot D, Gollnick H, Bettoli V, Dréno B, Kang S, Leyden JJ, et al. New insights into the management of acne: an update from the Global Alliance to Improve Outcomes in Acne group. *J Am Acad Dermatol*. 2009;60(5):S1-50.
5. Gollnick HP, Bettoli V, Lambert J, Araviiskaia E, Binic I, Dessinioti C, et al. A consensus-based practical and daily guide for the treatment of acne patients. *J Eur Acad Dermatol Venereol*. 2016;30(9):148090.
6. Plewig GK. A. Acne and Rosacea. New York: Springer. 2000.
7. Thielitz A, Abdel-Naser MB, Fluhr JW, Zouboulis CC, Gollnick H. Topical retinoids in acne—an evidence-based overview. *J German Soc Dermatol*. 2008;6(12):1023-31.
8. Thielitz A, Helmdach M, Röpke EM, Gollnick H. Lipid analysis of follicular casts from cyanoacrylate strips as a new method for studying therapeutic

- effects of antiacne agents. *Br J Dermatol.* 2001;145(1):19-27.
9. Czernielewski J, Michel S, Bouclier M, Baker M, Hensby C. Adapalene biochemistry and the evolution of a new topical retinoid for treatment of acne. *J Eur Acad Dermatol Venereol.* 2001;15:5-12.
 10. Michel S, Jomard A, Demarchez M. Pharmacology of adapalene. *Br J Dermatol.* 1998;139:3-7.
 11. Lavker RM, Leyden JJ, Thorne EG. An ultrastructural study of the effects of topical tretinoin on microcomedones. *Clin Ther.* 1992;14(6):773-80.
 12. Fabbrocini G, Annunziata MC, D'arco V, De Vita V, Lodi G, Mauriello MC, et al. Acne scars: pathogenesis, classification and treatment. *Dermatol Res Pract.* 2010;14:2010.
 13. Pandya AG, Guevara IL. Disorders of hyperpigmentation. *Dermatol Clin.* 2000;18(1):91-8.
 14. Leyden JJ, Shalita A, Thiboutot D, Washenik K, Webster G. Topical retinoids in inflammatory acne: a retrospective, investigator-blinded, vehicle controlled, photographic assessment. *Clin Ther.* 2005;27(2):216-24.
 15. Shalita AA, Weiss JS, Chalker DK, Ellis CN, Greenspan A, Katz HI, et al. A comparison of the efficacy and safety of adapalene gel 0.1% and tretinoin gel 0.025% in the treatment of acne vulgaris: a multicenter trial. *J Am Acad Dermatol.* 1996;34(3):482-5.
 16. Webster GF, Berson D, Stein LF, Fivenson DP, Tanghetti EA, Ling M. Efficacy and tolerability of once-daily tazarotene 0.1% gel versus once-daily tretinoin 0.025% gel in the treatment of facial acne vulgaris: a randomized trial. *Cutis.* 2001;67(6):4.
 17. Webster GF, Guenther L, Poulin YP, Solomon BA, Loven K, Lee J. A multicenter, double-blind, randomized comparison study of the efficacy and tolerability of once-daily tazarotene 0.1% gel and adapalene 0.1% gel for the treatment of facial acne vulgaris. *Cutis.* 2002;69(2):4.
 18. Purdy S, de Berker D. Acne vulgaris. *BMJ Clin Evid.* 2011;2011:1714.
 19. Gebauer K. Acne in adolescents. *Aust Fam Phys.* 2017;46(12):892.
 20. Leyden JJ, Shalita A, Thiboutot D, Washenik K, Webster G. Topical retinoids in inflammatory acne: a retrospective, investigator-blinded, vehicle controlled, photographic assessment. *Clin Ther.* 2005;27(2):216-24.
 21. Kolli SS, Pecone D, Pona A, Cline A, Feldman SR. Topical retinoids in acne vulgaris: a systematic review. *Am J Clin Dermatol.* 2019;23:1-21.
 22. Thielitz A, Abdel-Naser MB, Fluhr JW, Zouboulis CC, Gollnick H. Topical retinoids in acne—an evidence-based overview. *J Dtsch Dermatol Ges.* 2008;6(12):1023-31.

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