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A COMPARATIVE STUDY OF TOPICAL RETINOIDS ADAPALENE VS TAZAROTENE IN THE TREATMENT OF ACNE VULGARIS

Dr. P. Rukmini Reddy[1], Dr. Davu Hema[2]*

[1]Assistant Professor, DVL Dept., RVM, Institute of Medical Sciences and Research Center, Laxmakkapally (V), Mulugu (M), Siddipet (D), Telangana- 502279, India.

[2]Associate Professor, DVL Dept.,RVM Institute of Medical Sciences and Research Centre, Laxmakkapally (V), Mulugu (M), Siddipet (D), Telangana- 502279, India.

Corresponding Author*:

Dr. Davu Hema,

Associate Professor, DVL Dept., RVM, Institute of Medical Sciences and Research Center, Laxmakkapally (V), Mulugu (M), Siddipet (D), Telangana- 502279, India.

ABSTRACT

Background: Acne Vulgaris is widespread among teens. Acne isn't fatal, but it can be debilitating. Acne scarring can cause low self-esteem, social impairment, and rage.

Material and Methods: For the aforementioned study, 50 patients of either sex were enrolled and randomly assigned. The investigation was a single-blind, randomized, open-prospective clinical trial. It was conducted from September 2021 to August 2022, in the atDVL Dept., RVM Institute of Medical Sciences and Research Center, Laxmakkapally (V), Mulugu (M), Siddipet (D), Telangana- 502279, India.

Results: Many cosmetically aware teens about to marry sought treatment, however light. In this study, acne prevalence is directly related to sebaceous activity. 31% of patients had familial acne vulgaris. Acne is hereditary. 15% of women had pre-menstrual flare-ups attributable to pre-menstrual changes in pilosebaceous epithelium hydration.

Conclusion: This study found that men were more likely than women to have acne vulgaris. Regardless of gender, the age range of 15-20 years saw an increased incidence. In this study, it was shown that students had a noticeable incidence of acne vulgaris. The study's triggering elements were more prevalent in male patients.

Keywords: Adapalene, tazarotene, topical retinoids, acne vulgaris

INTRODUCTION

The skin condition known as acne vulgaris affects a staggering percentage of teenagers. Acne is not a life-threatening disorder, but it can significantly impact quality of life [1]. The

psychological effects of acne and the scarring it can leave behind include low self-image and self-esteem, difficulty interacting with others, and even anger [2]. Mild acne can nonetheless have a major effect on a person's emotional well-being, and for some people, the psychological and social stigma associated with the disease is the worst part of it. Mild to moderate acne has been linked to increased incidence of depression and suicide thoughts in teenagers [3, 4]. When compared to other chronic and disfiguring skin problems, this remains true. In conclusion, acne is a serious condition that must be treated properly to prevent scarring, psychological effects, and subsequent deficits in social function [5].

Over the past 25 years, both topical and systemic medicines have been used to successfully treat acne vulgaris. The smallest lesions that cause acne are termed microcomedones. These comedones are so tiny that the naked eye can't see them, but they nevertheless need to be taken into account when designing treatments. They are the primary lesions that can progress to either non-inflammatory comedones or inflammatory macules, papules, and pustules. A comedo is a non-inflammatory pore [6-8].

All retinoid chemicals originate from vitamin A. For the first time in 1962, it was established that they worked quite well in eliminating acne. Retinoids are able to correct the abnormal desquamation because they regulate cell proliferation and differentiation, which in turn affects the turnover of follicular epithelial cells. Adult comedones are expelled from the skin in this way, and the production of new microcomedones is halted [9]. By preventing hypercornification, the pilosebaceous follicle's microenvironment is altered. As a result, an aerobic environment is created that is hostile to Propionibacterium acnes and is likely to promote the penetration of other topical treatments. Topical retinoids have been demonstrated to have a direct anti-inflammatory impact in in vitro and animal studies. In addition, retinoids can alter the expression of transcription factors like AP-1, which regulate the genetic expression of inflammatory response-related growth factors and degradative enzymes. In addition, retinoids have a role in the induction of apoptosis via multiple pathways, some of which are connected to the activation of retinoid receptors and others of which function independently of this process [10, 11].

The results lend credence to and theoretical context for explaining the considerable reduction of inflammatory lesions seen in well-controlled clinical studies using various formulations of adapalene, tretinoin, and tazarotene. Clinical trials with adapalene, tretinoin [12], and tazarotene have shown decreases in inflammatory lesions consistent with these findings. Retinoids diminish the number of both non-inflammatory and inflammatory lesions and inhibit the formation of microcomedones in a dose-dependent manner. Therefore, retinoid topical

medication use as monotherapy, combination therapy, or subsequent maintenance therapy can be beneficial for the great majority of acne sufferers [13]. For the majority of acne types, topical retinoids are currently used as part of continuous treatment, often known as maintenance therapy. As the prevalence of antibiotic-resistant strains of P. acnes increases, the use of topical retinoids has the potential to lower the amount of antibiotics that are necessary to treat acne [14-16]. Therefore, a systematic study into the effectiveness and safety of topical retinoids for acne treatment is warranted. The study's goal is to determine which topical medication, adapalene or tazarotene, is more effective in treating acne vulgaris.

MATERIALSANDMETHODS

The above study enrolled and randomly assigned 50 patients of either gender. The study was a randomised open prospective comparative clinical trial with a single blind. It was carried out in atDVL Dept., RVM Institute of Medical Sciences and Research Center, Laxmakkapally (V), Mulugu (M), Siddipet (D), Telangana- 502279, IndiafromSeptember 2021 to August 2022.

InclusionCriteria

- Acne vulgaris sufferers of any sex whose condition is mild to moderate

ExclusionCriteria

- Females in Pregnancy and Those breastfeeding, Skin breakouts brought on by medication.
- Sensitivity to pharmaceuticals under-12 set.

TreatmentProtocolandMethodology

Selected patients were informed of the study's goals and consent was obtained from them. The patients' ages, sexes, occupations, marital statuses, and lengths of illness were recorded. Acne treatments, both past and present, were recorded, and patients were advised to forego any more methods of therapy. Acne is known to worsen in the summertime, especially for some people, and stress and menstrual cycle fluctuations have been recognised as possible contributors. A record of past smoking habits was also made. Additional symptoms of hyperandrogenism such as hirsutism, oligomeorrhea, and irregular menstruation were also discovered. Patients were given a full body checkup. Acne and other skin abnormalities were identified during a thorough dermatological examination. Assessed the number and severity of comedones, papules, and pustules. There were 100 patients that fit the criteria, and they were randomly split in half. Clinical photographs of the lesions were taken prior to and during the course of treatment. Regular check-ins were requested, and patients were urged to report any major side effects immediately. Married women were encouraged to use oral contraceptives as a form of birth control during their treatment. Twelve weeks were devoted to the aforementioned trial.

MethodofApplication

The patients were instructed to stay away from applying cosmetics or other topical treatments on their faces.

Group-I

0.1%adapalenecream

Before going to bed, adapalene is applied to the entire face once each day. The patient was instructed to wash their face before applying a thin layer of the adapalene cream, being sure to keep their lips, eyes, and mucous membranes out of the way. Adapalene was first applied for an hour before being removed using soap and water. If there is no itch or other negative reaction, the time can be gradually increased or administered overnight.

Group–II

0.1%TazaroteneCream

Once a day, tazarotene is spread evenly across the face before sleeping. After a 2-minute facial wash with soap and water, patients were told to apply tazarotene cream before applying moisturiser. Time can be increased up to a maximum of five minutes. The period should be shortened to three minutes if the annoyance is severe. Keep the product away from your eyes, lips, and other mucous membranes. Patients in both groups were informed of the potential risks associated with topical retinoids such as dryness, erythema, skin irritation, peeling, and itching. Significant adverse effects were quickly recorded, and patients were evaluated every two weeks. At each session, the patient detailed the therapy's positive and bad outcomes. Patients were also instructed to take precautions against sun exposure, such as using sunscreen.

RESULTS AND OBSERVATIONS

In the current investigation, the following observations were made. 35 of the 50 patients in the trial were men, and 15 were women. They belonged to the 15 to 29 year old age bracket. Patients included schoolchildren, while others were working people and housewives. With a mean of 17 months, the duration of acne ranged from 6 months to 8 years. Acne ran in the family for the patients. According to the patient's history, the following triggering variables were noted.

- 15% of individuals reported worsening symptoms just before their periods.
- Exacerbations in the summertime affect 23% of patients.
- Indicators of stress, such as lack of formal training or work, were present in 35% of the patients

- Thirty percent or more of patients reported a smoking history.

30% of patients had a history of prior topical application. The time between the previous topical therapy and the current one ranged from six months to three years. 10% of patients received systemic antibiotic therapy. None of them were receiving systemic retinoid therapy. With several patients, specifics on topical use were unavailable. Forty-eight of the 100 patients had Grade I acne, and forty-two had Grade II acne. In this study, seborrheic dermatitis, vitiligo, tinea versicolor, and polymorphic light eruption were the dermatological diseases linked to acne.

Table 1: SexDistribution

Male	Female
35	15

Inthisstudy,Acnevulgarisshowedincreasedprevalenceamongmales.

SexDistribution

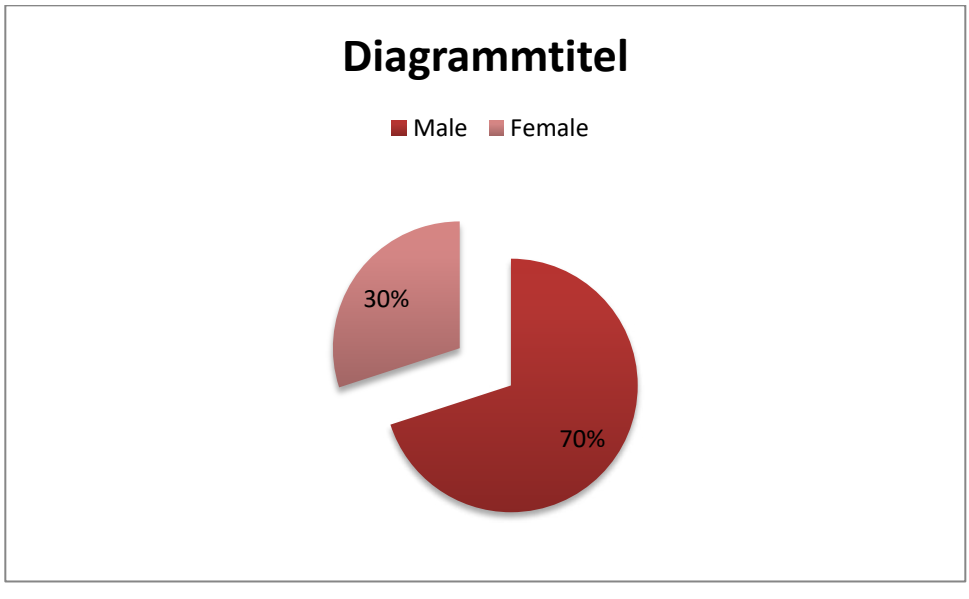


Fig. 1 Sex Distribution

Table 2: AgeDistribution

Age	Male (N-35)	%	Female (N-15)	%
15-20	21	0%	10	66.66%
21-25	10	8.57%	03	20%
26-29	04	1.42%	02	13.33%

Regardless of sex, the highest occurrence was seen in people between the ages of 15 and 20, when looking at the age distribution.

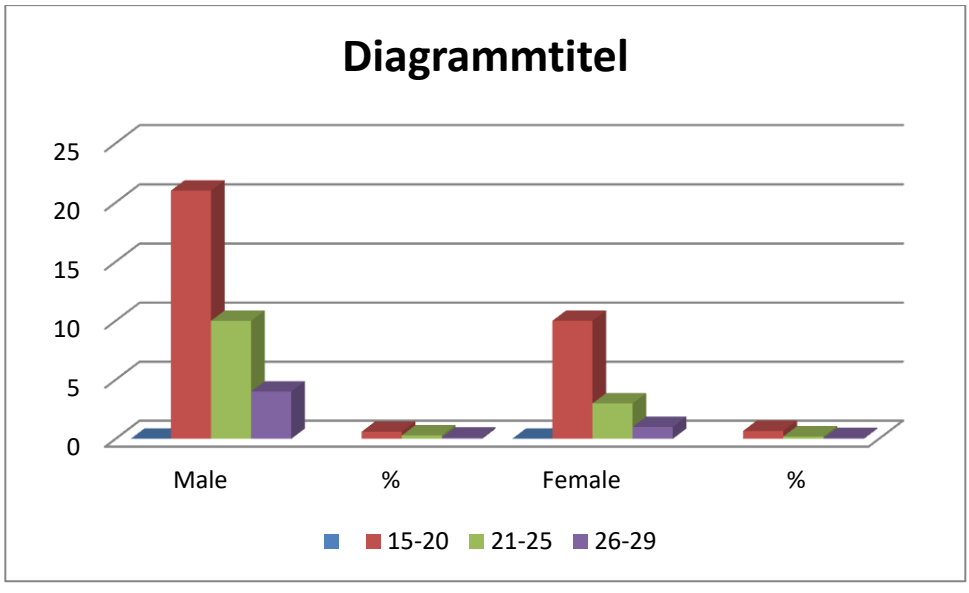


Fig: AgeDistribution

The following observationswere made in thisstudy

Table 3: OccupationalStatus

	Male(35)	Female(15)
Students	27	08
OtherOccupation	05	05
Unemployed	03	-
Housewives	-	02

As was seen in the aforementioned study, acne vulgaris is very common amongst students.

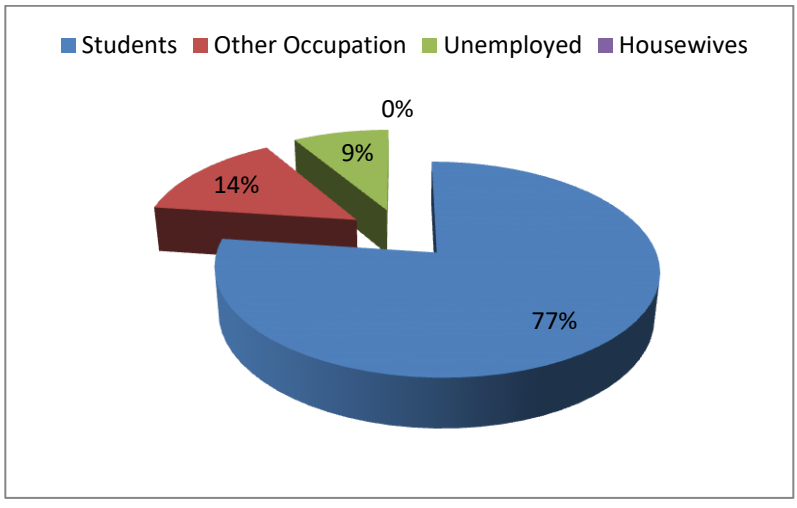


Fig. 3: OccupationalStatus

Table 4: Causes and risk factors for acne vulgaris (in percentage)

	Male	**Female**
SummerExacerbation	05	02
Stress	20	08
PremenstrualFlare	-	05
Smoking	10	-

PrecipitatingFactors

Table 5: Acne vulgaris is often linked to other skin conditions

Diseases	**Male(n)**	**Female(n)**
Pityriasisversicolor	4	2
vitiligo	2	-
Polymorphiclight eruption	5	4
Seborrhoeicdermatitis	7	2

Patients treated topically with adapalene (0.1% cream) had positive therapeutic responses.

The effects of the adapalene (0.1% cream) treatment ranged from a modest to good response. The overall number of lesions decreased to 42% after around 6 weeks. 60% of the lesions disappeared at the end of 8 weeks. The overall decrease rate was 80.3% after 12 weeks.

Table 6: Group I acne patients' reactions to topical adapalene observation

	Averagenumberoflesions(weeks)							**Averagenumber oflesions reduced**	**PercentageReduction**
	0	**2**	**4**	**6**	**8**	**10**	**12**		
Comedones	7.1	8.2	5.6	5.0	2.9	2.5	2.1	6.0	73.1%
Papules	6.1	4.5	5.2	4.1	3.1	2.1	0.7	5.1	84.9%
Pustules	1.7	1.2	0.8	0.3	0.1	0.2	0.1	1.9	100%

Table 7: Patients treated with topical tazarotene (0.1% cream)

	Averagenumberoflesions(weeks)							**Averagenumber oflesions reduced**	**% Reduction**
	0	**2**	**4**	**6**	**8**	**10**	**12**		
Comedones	9.1	9.0	8.2	7.1	5.1	4.8	4.1	5.1	52.2
Papules	2.1	5.0	5.1	4.1	4.1	3.9	2.1	3.2	51.30
Pustules	0.6	0.7	0.9	0.1	0.2	0.3	0.4	0.8	100.00

Topical administration of tazarotene cream resulted in a slight enhancement, as demonstrated by this study. The decline was only 7.70% after roughly 4 weeks. Eight weeks later, the rate of decline was 29.8 percent. After 12 weeks, the cumulative rate of decline was 54.07 percent.

Therapeutic Response in Relation to Age

Group-I

Table 8: Topical 0.1% Adapalene Cream

AgeGroup	Response		
	Mild	Moderate	Good
15-20	1	13	15
21-25	2	4	9
26-29	3	2	7

Group-II

Table 9: 0.1% Tazarotene Topical Cream

AgeGroup	Response		
	Mild	Moderate	Good
15-20	3	12	3
21-25	7	5	2
26-29	8	3	-

Both Group I and Group II patients in this study displayed a moderate to good response in the 15-20 year old age range.

COMPLICATIONS

The negative effects experienced during treatment with topical 0.1% adaplene cream were mild and only lasted a brief time. Erythema, dryness, skin irritation, and itching were among the more frequent side effects seen with this medication. Topical tazarotene treatment resulted in significant, protracted erythema and skin peeling, which decreased patient compliance. The daily topical use of tazarotene was limited to 3 minutes only because of its significant negative effects.

Table 10: side effects seen while undergoing treatment

SideEffects	Group – IAdapalene0.1%	Group – IITazarotene0.1%
Erythema	08	11
Skinburning	09	12
Peeling	-	3
Dryness	3	10
Exacerbation	5	-
Itching	6	2
Infections	-	-

SIDEEFFECTS

Table 11: The reaction after therapy for Groups I and II

Response	Adapalene0.1%Cream	Tazarotene0.1%Cream
Nil	-	3
Mild	-	12
Moderate	15	08
Good	20	1

This study found that 31% of the patients who received 0.1% adaplene cream responded well, while 19% of the patients shown a moderate response. This study found that of the patients given topical tazarotene cream 0.1%, 27% had a mild reaction, 17% had a moderate response, and 3% had a good response.

Table 12: Topical adapalene vs. tazarotene patients (average number of lesions)

Weeks	Adapalene	Tazarotene<13.5
3	12.1	13.2
5	10.2	12.5
4	9.2	11.0
7	7.1	9.4
11	5.2	7.5
12	4.0	6.4
%ofImprovement	80.3%	54.07%

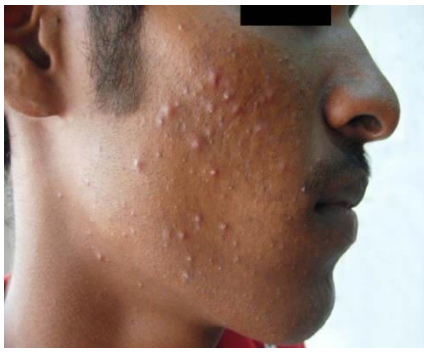
After 12 weeks of treatment, those using topical adapalene showed an 80.30% improvement, whereas participants using topical tazarotene showed a 54.07% improvement.

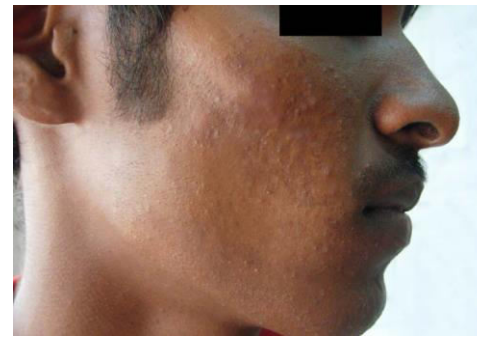
Table 13: Comparing acne lesion decrease after 2 weeks

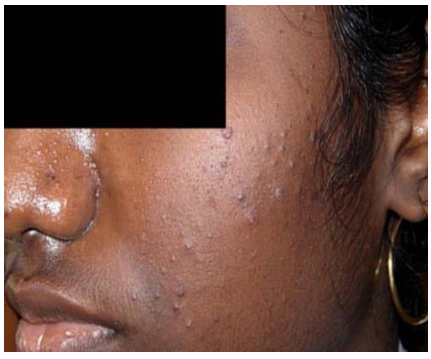
Weeks	Group–I	Group–II
1	17	7.5
3	26	7.1
5	49	24.8
7	59	28.1
11	74	32.3
12	81.2	55.06

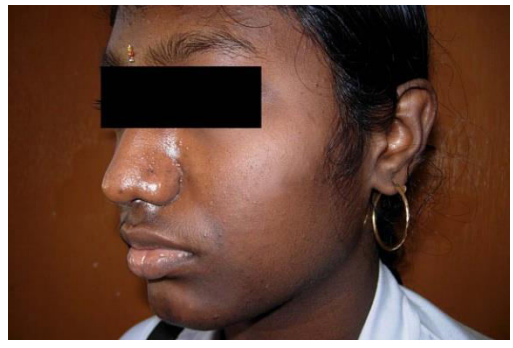
Examining the Acne Lesions Clearing Rate at Each Two-Week Mark

Beforetreatment12weeksaftertreatment









DISCUSSION

Acne vulgaris, also known as the "Stigma of Adolescence," is responsible for more misery in adolescents than any other factor combined. Despite the fact that the ailment may not be severe, a significant number of young adults who are planning to get married in the near future sought therapy. According to the findings of this study, a direct association exists between increased sebaceous activity and the rising incidence of acne in the student population. A history of acne vulgaris in the patient's family was found in 31% of cases. There is evidence that a hereditary element contributes to the development of acne [12, 13]. Premenstrual flare ups were experienced by 15% of female patients, and were assumed to be caused by a change in the hydration of the pilosebaceous epithelium. Acne lesions are known to worsen in response to increased physical and emotional stress, as well as the warmer temperatures associated with summer. Treatment for acne aims to diminish the pathophysiology of acne by reducing sebum production, correcting abnormal ductal keratinization, decreasing the population of propionibacterium acnes, and inhibiting the release of inflammatory mediators. [14, 15].

Acne inflammatory and non-inflammatory lesions were reduced to a greater extent in this group of patients, who had a moderate to good response. This group of patients likewise improved more than the others. Sixty percent fewer acne lesions were present after eight weeks, with an additional twenty-five percent improvement seen after four weeks. After 12 weeks of treatment, the reduction had reached 80.3%, indicating a moderate to good response. [16] Negative side effects, such as skin irritation, itching, dryness, erythema, and peeling, were experienced by a small number of people. The side effects were minimal and brief when compared to those caused by topical tazarotene cream 0.1%. Treatment with 0.1% topical adaplene cream was well tolerated by patients, and positive results were seen by the end of the trial. Regular attendance at appointments ensured that patients received the attention they needed. Only a minority of people experienced these negative side effects; the great majority had no reactions at all [17, 18].

Patients in this group exhibited a moderate response in inflammatory as well as non-inflammatory lesions. In this investigation, the adverse effects were of a very serious kind. During the first week of treatment, the majority of patients had erythema, scaling, and dryness of the skin. When compared to those caused by topical adapalene, the adverse effects that were seen in this group were more severe and lasted for a longer period of time [19]. The decrease rate was 7% after the medication had been administered for a period of four weeks. After a period of 12 weeks, the total reduction was found to be 50.04 percent. The adverse effects that were seen in this investigation have also been documented in the relevant previous research [20]. Adapalene cream with a topical concentration of 0.1% showed acne lesions that had improved to a moderate to good degree overall. A topical treatment consisting of 0.1% tazarotene demonstrated just a slight improvement while producing a greater number of adverse effects. The adverse effects that were seen with topical adaplene cream were substantially lower than those that were seen with topical tazarotene cream, as was shown in this study. These findings are based on earlier research that was carried out at a variety of institutes and research centres [21-23].When compared with adapalene, previous research indicates that tazarotene is associated with a much higher incidence of patients experiencing a 50% or greater improvement. In contrast, the use of adapalene was associated with a much higher percentage of patients reaching a higher level of improvement in this particular trial. (80% vs. 50% P = 0.01).

CONCLUSION

The prevalence of Acne Vulgaris was higher among males in this study. The highest rates were found in individuals between the ages of 15 and 20, across both sexes. Almost all of the students in this study suffered from severe cases of acne vulgaris. More characteristics associated with male precipation were discovered in this investigation. Adapalene cream 0.1% was superior to tazarotone cream 0.1% in all tests. Adapalene and tazarotene creams worked well for those between the ages of 20 and 30. 10 weeks of treatment with topical adapalene resulted in over 75% of lesions clearing, while treatment with topical tazarotene resulted in just 30% of lesions clearing. When compared to tazarotene, the side effects of adapalene cream were relatively low and short-lived.

Conflict of Interest:

Nil

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Nil

BIBLIOGRAPHY

1) LaurieTolman,AcneandacneiformDermatosesChapter–58MoscellaandhurleydermatologyIIIEdition(1992);
2) Eugene Healy, Nick Simpson, Acne Vulgaris, British Journal ofDermatologyMarch 1994;Vol. 308,831-833.
3) Darley C.R. Kirby JD, Besser G M, Munro D D, Edwards C R,Lees LH, Circulating testosterone, sex hormone binding globulinand prolactin in women with late onset or persistent acne vulgaris.BritishJournalofDermatology;1982May; 106:517-22.
4) Schmidt JDB Lindmai A, sponaj; Endocrine parameters in acnevulgarisendocrinalExp1990Dec24;457-64.
5) Lever L, MR. Current views on the etiology, pathogenesis, andtreatmentofacnevulgaris. Drugs1990; 39:681-692.
6) BikowskiJB.Mechanismsofthecomedolyticandantinflammatoryproperties of topical retinoids J Drugs Dermatal20054:4-47.
7) Craven,NM,GriffithsCEM.Topicalretinoidsandcutaneousbiology.Clin ExpDermatol 1996; 21:1-10.
8) CunlaffeW.T.andSimpsonN.B."DisordersofSebaceousGlands
– Chapter:42",Rook,Wilkinson,Ebling"TextbookofDermatology". Edited by R.H. Champion. N.J. Burton Burns, S.M.BreathnachVIEdition(1998)Vol31927-1984.
9) Thiboutot D, Harris G, Cimis G, Gilliland K, Activity of the type –1 5 a reductase exhibits regional difference in isolated sebaceousglands and whole skin, Journal of Invest Dermatology 1995; 105;209-14.
10) Jebraile R, Kaur S, Kanwar A R, Kataria S, Dush R, Hormoneprofile and polycystic ovaries in acne vulgaris, Indian Journal ofMedicine,Res 1994 Aug; 100;73 – 6.
11) KnaggsH,HollandK,MorrisC,WoodE,CunliffeW.D,Qualification of cellular proliferation in acne using the monoclonalantibodyKi-67,JournalofInvestDermatol1994;102:89-92.
12) Meta-analysisoftopicaltazaroteneinthetreatmentofmildtomoderate acne. Leyden JJ. Department of Dermatology, UniversityofPennsylvania Hospital,Philadelphia, USA.
13) Jappe U, Ingham E, Henwood J, Holland KT. Propionibacteriuma cnesandin flammation inacne;P.acneshasT-cellmitogenicactivity.Br J Dermatol.202;146:202-209
14) Webster GF. Inflammation in acne vulgaris.J Am Acad Dermatol.1995;33:247-253

15) Leyden J, Lowe N, Kakita L, Draelos Z. Comparison of treatmentof acne vulgaris with alternate-day applications of tazarotene 0.1%gelandonce-daily application sofadapalene 0.1%gel:arandomizedtrial.Cutis. 2001;67(suppl6):10-16.

16) Cutis.2005May:75(5):289-93.RelatedArticles,LinksCumulative irritation potential of adapalene 0.1% cream and gelcompared with tazarotene cream 0.05%and0.1% .Dosik JS.Homer K. Arsonnaud S. TKL Research, Inc, Paramus, New Jersey,USA.

17) J Drugs Dermatol. 2005 Mar-Apr; 4(2) : 153-8. Related Articles.Links Tazarotene cream versus dapalene cream inthetreatment of facial acne vulgaris: a multicenter, double – blind, randomized,parallel– group study.

18) A multicenter, double-blind, randomized comparison study of theefficacy and tolerability of once – daily tazarotene 0.1% gel and adapalene 0.1% gel for the treatment official a cnevulgaris.WebsterGF,GuentherL,PoulinYP,SolomonBA,mLovenK,Lee J.Departmetn of Dermatology, Jefferson Medical College,Philadelphia,Pennsylvania.USA.

19) WebsterGF,GuentherL,PoulinYP,SolomonBA,LovenK,LeeJ.Amulticenter,double-blind,randomizedcomparisonstudyofthe efficacy and tolerability of once –daily tazarotene 0.1% cream and adapalene 0.1% cream for the treatment of a cnevulgaris.Cutis.2002;69(suppl2):4-1

20) Cutis.2001Jun;67(6Suppl):10-6.RelatedArticles,Links Comparison of treatment of a cnevulgaris with a lt ernate-day applications of tazarotene 0.1% gel and once –daily applications ofadapalene 0.1% gel: a randomized trial.

21) Leyden J. Lowe N, KakitaL,DraelosZ .Department of Dermatology,University of Pennsylvania,Philadelphia, USA.

22) JAmAcadDermatol.2000Aug:43(2Pt3):S51-4.RelatedArticles, Links.Int J Dermatol. 1997Jun; 36(6) : 416-8. Related Articles, Links.IntJDermatol.1997Jun;36(6):416-8.RelatedArticles,Links

23) Am J Clin Dermatol. 2003;4(3): 197-202. Related Articles, Links optimizing treatment with topicaltazarotene.GuentherLC.Division of Dermatology, University of Western Ontario. London,Ontario,Canada.