Topical therapy of acne vulgaris using 2% tea lotion in comparison with 5% zinc sulphate solution

Khalifa E. Sharquie, MD, PhD, *Adil A. Noaimi,* DDV, FICMS, *Mazin M. Al-Salih,* MD.

ABSTRACT

الأهداف: تقييم فعالية محلول الشاي بتركيز 2% بالمقارنة مع محلول كبريتات الزنك بتركيز 5% في معالجة العد الشائع.

الطريقة: أجريت هذه الدراسة في قسم الامراض الجلدية والزهرية – مستشفى بغداد التعليمي – بغداد – العراق، خلال الفترة مابين يونيو 2006م وحتى ديسمبر 2007م. تم تقسيم سبعة وأربعون مريضاً مصاباً بالعد الشائع بشكل عشوائيا إلى مجموعتين، وتم إرشادهم لاخذ المحاليل التالية لمدة شهرين: مجموعة (أ) محلول الشاي بتركيز 2% مرتين يومياً، مجموعة (ب) محلول كبريتات الزنك بتركيز 5% مرتين يوميا. ان العد الشائع المعالج هو من النوع البسيط (العد الشائع الشديد لم يدخل في الدراسة). قُسم التحسن السريري عن طريق حساب عدد الأضرار الالتهابية قبل وبعد العلاج.

النتائج: أكمل أربعون مريضاً هذه الدراسة. تراوحت اعمار المرضى مابين 13–27 عاما، وكان معدل الانحراف المعياري لأعمار المجموعتين معاً هو 19.5±3.5 عاماً، واحتوت كل مجموعة عشرين مريضاً. إحصائياً، كان محلول الشاي بتركيز 2% ذو أهمية في تقليل عدد الأضرار الالتهابية في العد الشائع. أما محلول كبريتات الزنك بتركيز 5% كان مفيداً ولكن لم يصل إلى مستوى الأهمية الإحصائية مثل محلول الشاي.

خاتمة: يعتبر محلول الشاي بتركيز 2% دواء بديل وجيد يمكن استخدامة في مرضى العد الشائع. وقد تفوق بشكل كبير على محلول كبريتات الزنك بتركيز 5%.

Objectives: To evaluate effectiveness of 2% tea lotion in comparison with 5% zinc sulphate solution in the treatment of acne vulgaris.

Methods: This is a single-blind randomly comparative therapeutic clinical trial carried out in the Department of Dermatology, Baghdad Teaching Hospital, Baghdad, Iraq from June 2006 to December 2007. Full history and clinical examination were studied for each patient regarding all relevant points of the disease, to evaluate the severity of acne. Forty-seven patients with acne vulgaris were divided randomly into 2 groups, and were instructed to use the following solutions twice daily for 2 months; group A used 2% tea lotion, group B used 5% zinc sulphate solution. Patients with papulopustular lesions were included in the study, while patients with severe acne were excluded. The clinical improvement was scored by counting the number of inflammatory lesions before, and after treatment.

Results: Forty patients completed the study, their ages ranged from 13-27 years with a mean±standard deviation of 19.5±3.5 years with 20 patients in each group. Two percent tea lotion was statistically significant in decreasing the number of the inflammatory lesions in acne vulgaris, while 5% zinc sulphate solution was beneficial, but did not reach statistically significant level as tea lotion.

Conclusion: Two percent tea lotion was a good alternative remedy to be used in the treatment of acne vulgaris, and was much superior than topical 5% zinc sulphate solution.

Address correspondence and reprint request to: Professor Khalifa E. Sharquie, Chairman of the Scientific Council of Dermatology and Venereology, Department of Dermatology and Venereology, Iraqi Board for Medical Specializations, Medical Collection Office, PO Box 61080, Postal Code 12114, Baghdad, Iraq. Tel. +964 (790) 1468515. E-mail: ksharquie@yahoo.co.uk

Acne vulgaris is a chronic inflammatory disease of pilosebaceous units affecting adolescents individuals, which is characterized by the formation of comedons, erythematous papules, and pustules on the face, neck, upper trunk, and upper arm. It occurs primarily in the oily (seborrheic) areas of the skin.[1,2] Acne is a disease involving the pilosebaceous unit, and is most frequent

and intense in areas where sebaceous glands are largest and most numerous. Acne begins in predisposed individuals when sebum production increases. Propionibacterium acnes (P. acnes) which is an anaerobic normal skin flora of the hair follicles that proliferates in sebum, and the follicular epithelium becomes altered, and form plugs called comedons, and multiple factors are involved in the pathogenesis of acne vulgaris.[3] In general, there are 4 major principles governing the therapy of acne: correct the altered pattern of follicular keratinization, decrease sebaceous gland activity, reduce follicular bacterial population, and produce an anti-inflammatory effect.[1,3] Treatment of acne vulgaris includes topical agents such as erythromycin, clindamycin, benzoyl peroxide, azelaic acid, and retinoic acid. While systemic therapy includes oral antibiotic such as tetracycline, erythromycin, cotrimoxazole, oral retinoid, and hormonal therapy.[2,4-7] Moderate acne resistant to topical antibiotic or acne, which covers a large portion of the body surface may be best treated with orally administered antibiotic. Oral antibiotics has 2 important actions; first and most obvious is suppressing the growth of P. acne, and thereby reducing the production of inflammatory mediators, synthesized, and released by this pathogen, the second one is through direct suppression of inflammation. Tetracycline and erythromycin can cause a decrease in neutrophilic chemotaxis, and the production of chemotactic factors.[8] Tea contain many chemicals such as tannin, the phenolic group of tannin (mainly catechine), that are responsible for its antibacterial effect, and it was shown to be effective topically in the treatment of acne vulgaris and impetigo contagiosum as through its antibacterial activity.[9-12]

Epigallcatechins gallate of tea was reported to modulate the production, and biological action of androgens and hormones. Modulation of androgenic activity may be useful for treatment of various hormone related abnormality such as baldness, acne, and androgen dependent alopecia.[13] Zinc is one of the essential trace elements.[14] Zinc forms an integral part of several enzymes and co-factors, and is an essential element in cell growth.[15] After application for 72 hours, percutaneous absorption of zinc sulphate results in the increase in zinc concentration in the whole skin and epidermis. The more zinc is applied to the skin, the greater is the increase in epidermal zinc level. Topical zinc ions traverse the skin, and can be found in the dermis and blood. A recent study demonstrated zinc concentration in the skin could increase 8-fold by topical application of zinc sulphate. A concentration of 3% was optimal. Zinc oxide is extremely insoluble, and could not be expected to be similarly active.[16] Two percent Zinc sulphate solution was found to be effective as an intralesional therapy with cure rate of 94.7%

for cutaneous leishmaniasis and 98.2% for verruca vulgaris.[17,18] Also, topical solution (10%) was effectively used for plane warts.[19] Recently, zinc sulphate solution was found to be effective in the treatment of superficial fungal infection in 10%, and 15% concentrations.[20,21] Oral zinc sulfate solution was successfully tried in the treatment of cutaneous leishmaniasis, rosacea, and viral warts.[22-24] The objective of the present study is to evaluate the effectiveness of 2% tea lotion in comparison with 5% zinc sulphate solution in the treatment of acne vulgaris.

Methods. *Study design.* Single-blind randomly comparative therapeutic clinical trial. The study was conducted at the Department of Dermatology and Venereology, Baghdad Teaching Hospital, Baghdad, Iraq between June 2006 to December 2007. A total number of 47 patients (33 females and 14 males) with female to male ratio of 2.3:1 were enrolled in this study. Their ages ranged from 13-27 years with a mean±SD of 19.5±3.5 years. Full history was taken from each patient regarding age, gender, site of acne, aggravating, and relieving factors (medical, surgical, drug), history, family history, duration of the disease, previous treatment, and ensured that every patient had stopped any systemic and topical treatment at least 2 months before starting the present therapy. Physical examination was carried out to evaluate the severity of the acne. Scoring the severity of acne was chosen according to following rules:[3] mild acne in which the count of pustules is less than 20 pustules and the count of papules is less than 10, moderate acne in which the count of pustules ranged between 20-40 pustules and the count of papules ranged between 10-30 papules, while severe acne in which the count of pustules is more than 40 pustules and the count of papules is more than 30. Patients in the treatment for acne for the last 2 months, and those with comedonal, severe acne and nodulo-cystic lesions were excluded from the present study for ethical reason. Patients on therapy for systemic diseases such as corticosteroid, hormones, and remedies that induce acniform rash were also excluded.

Informed consent was obtained from each patient before starting therapy, after full explanation regarding: nature of the disease, course, prognosis, and its complication. Also, full information related to this therapy includes: action and way of applications, duration and follow up. The ethical approval was granted by the Scientific Committee of the Scientific Council of Dermatology and Venereology, Iraqi Board for Medical Specializations. A photograph was taken at the initial and subsequent visits by a mercury digital camera cyberplx S-450V at the same place, and with a fixed illumination.

Patients were divided randomly into 2 groups: Group A - 24 patients (17 females and 7 males) were treated with 2% tea lotion. Their ages ranged from 14-26 years with a mean±SD of 19.2±3.3 years. Each patient was instructed to use the lotion topically twice daily for 2 months, and clinical evaluation was carried out every 2 weeks. The assessment carried out by counting the inflammatory lesions (papules and pustules), and reporting any side effects. Group B - 23 patients (16 females and 7 males) used 5% zinc sulphate solution in the similar manner with group A. Their ages ranged from 13-27 years with a mean±SD of 19.8±3.8 years. The response of the patients to treatment was classified as: good response in which the reduction in the count of inflammatory lesions (papules and pustules) is more than 50%, moderate response in which the reduction in the count of inflammatory lesions (papules and pustules) is between 10-50%, and no response in which the reduction of papules and pustules is less than 10%.

The tea leaves (Apple brand mark) was extracted with distilled water (35 gm of tea was mixed with 100 ml boiling hot distilled water for 30 min.), then we allowed the tea extract to cool down, and took 100 ml of tea extract and 100 ml of distilled water, and it was weighed. The excess weight in the extracted tea is the amount of pure tea in the tea lotion, (for example if the difference is one gram between the tea lotion and distilled water, then the percent is one, and if the excess is 2 grams the concentration of tea is 2%.[9] The 1% tea extract was boiled again until two thirds of water had evaporated, to reach 3% tea extract concentration. The 2% tea lotion (100 ml) was prepared by adding 75 ml of the tea extract to 25 ml of ethanol (95% purity), which was used as a preservative. Five percent (weight/volume) zinc sulphate solution was prepared by dissolving 5 grams of zinc sulphate crystals (zinc sulphate heptahydrate = 287.54 from MERK, France) in 95 ml of distilled water (pH= 5.5) preservative.

Statistical analysis was carried out by computer using EPI version 6. Both descriptive and analytic data were used. The calculation of mean and SD was carried out for ages, papules, and pustules. Comparison before and after treatment in each group was made by using paired t-test, comparison of the patient response to treatment in the 2 groups was carried out by using the chi-square. A *p*-value less than 0.05 was considered as the level of significance.

Results. From the 47 patients involved in this study, 40 patients completed the course of treatment. There were 20 patients in group A [14 (70%)] females, [6 (30%)] males, 20 patients in group B [15 (75%)] females, [5 (25%)] males, and 7 patients (14.8%) did not complete the treatment and considered defaulter for

unknown reasons (4 from group A, and 3 from group B). The duration of the disease ranged between 2 months and 10 years. Positive family history was found in 19 (40.4%) patients. Five (10.6%) patients were smokers. The aggravating factors of the disease were mainly: sweating in 13 (27.6%) patients, psychological stress in 10 (21.2%) patients, heat in 7 (14.8%) patients, spicy foods in 4 (8.4%) patients, summer time in 3 (6.3%) patients, sun exposure in 2 (4.2%) patients, and fatty foods in one (2.1%) patient.

Clinical results. Group A (tea lotion) - Evaluation of patient's response to treatment. Three (15%) patients showed no response, while 5 (25%) patients showed moderate response, and 12 (60%) patients had good response. The assessment of mean±SD of papules and pustules count before and after treatment were as follows: the number of papules ranged from 6-37 with a mean±SD of 23.3±10.9, that was reduced to 12±8.7 after treatment. This reduction was statistically significant (*p*=0.0003). The number of pustules ranged from 15-45 with a mean±SD of 29.5±11.5, that was reduced to 14.5±10.7 after treatment. This reduction was statistically significant (*p*=0.0001) (**Figure 1**) (**Table 1**). No important side effects were reported apart from mild itching in 5 (25%) patients only in the early course of treatment, which disappeared with subsequent treatment.

Group B (zinc sulphate) - Evaluation of patient's response to treatment. Seven (35%) patients showed no response, while 10 (50%) patients had moderate response and 3 (15%) patients showed good response. The assessment of mean±SD of papules and pustules count before and after treatment were as follows: the number of papules ranged from 8-36 with a mean±SD of 19.5±9.7, that was reduced to 14.4±8.6 after treatment. This reduction was statistically not significant (*p*=0.08). The number of pustules ranged from 9-44 with a

Table 1 - Mean±SD of papules and pustules counts before and after therapy.

Group	0 week		8 weeks	
	Mean±SD	*P*-value	Mean±SD	*P*-value
Group A				
Papules	23.3±10.9		12±8.7	
Pustules	29.5±5.8		14.5±10.7	
Significance: t-test				
Papules	13.21	0.0003		
Pustules	18.08	0.0001		
Group B				
Papules	19.5±9.7		14.4±8.6	
Pustules	19.4±9.3		15.2±9.5	
Significance: t-test				
Papules	3.11			0.08
Pustules	2.03			0.16

Figure 1 - Seventeen-year-old male with **a)** severe acne vulgaris before treatment. **b)** moderate acne vulgaris after 2 months treatment with tea.

mean±SD of 19.4±9.3 that was reduced to 15.2±9.5 after treatment. This reduction was statistically not significant (p=0.16) (**Table 1**). No important side effects were reported apart from burning sensation in 5 (25%) patients, and itching in 2 (10%) patients in the early course of treatment, which was reduced with subsequent treatment.

Discussion. Acne is a major problem among youth. It is a multifactorial disease involving the pilosebaceous unit, and is most frequent and intense in areas where sebaceous glands are largest and most numerous.[3] One of the most etiological factors in the pathogenesis of acne vulgaris is bacteria. Propionibacterium acnes is the most important bacteria engaged in the causation of acne vulgaris.[9-12] There are many drugs and preparations used in the treatment of acne vulgaris such as topical treatment such as erythromycin, clindamycin, benzoyl peroxide, azelaic acid and retinoic acid.[2,4-7] The present study confirmed the findings in the recent Iraqi study, which showed that 2% tea extract lotion was effective in the clearance of papules and pustules, especially in mild and moderate acne.[12] This result was comparable to other topical agents, such as topical benzoyl peroxide and topical erythromycin, but tea lotion has more rapid action than erythromycin as it causes significant reduction after the eighth week, while topical erythromycin caused significant reduction after the twelfth week.[3,6] The mechanism of action of the tea lotion is probably related to the antibacterial effect of catechine.[9-12] The tea lotion showed no side effects and considered very safe when compared with other topical therapy that are commonly associated with local and systemic side effect

such as benzoyl peroxide and tretinoin. Zinc is one of the essential trace elements.[14] Zinc sulphate was used in the treatment of many skin diseases such as, cutaneous leishmaniasis,[17] superficial fungal infection,[20,21] and others, and proved to be effective, and has no potential side effects.[16-25] Zinc sulphate has many actions such as, anti-inflammatory action,[26] antimicrobial,[17,18,21,22] and other actions. The limitation of the present work was 8 weeks; this was carried out to be compared with a previous Iraqi study that the period time of that study was also 8 weeks.[12] The present study found that 5% zinc sulphate solution was effective in the treatment of acne vulgaris, but statistically not significant in comparison with 2% tea lotion. Zinc sulphate's usefulness in the treatment of acne is probably based on its anti-inflammatory action as many controlled studies have shown an efficacy on inflammatory lesions.[25,26] The present study is comparable with previous one which suggests that topical zinc therapy alone is not of high significant benefit in the treatment of acne.[27]

In conclusion, 2% tea lotion was an effective mode of therapy in the treatment of patient with mild -moderate acne vulgaris with much more benefit than 5% zinc sulphate solution. Further study is highly recommended using large number of patients with more extended time and to be compare with standard topical remedies.

References

1. Cunliffe WJ, Simpson NB. Disorder of the Sebaceous Glands. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. 7th ed. Rook's Text Book of Dermatology. Oxford (UK): Blackwell Scientific Publication; 2004. p. 15-57.

2. James WD, Berger TG, Elston DM, editors. In: Andrews Disease of the Skin Clinical Dermatology. 10th ed. Philadelphia (PA): WB Saunders Company; 2006. p. 231-250.

3. Habif TP, editor. Acne, rosacea and related disorder. In: Clinical Dermatology: A color guide to diagnosis and therapy. 4th ed. Mosby: Elsevier; 2004. p. 162-201.

4. Ellis CN, Leyden JJ, Katz HI, Goldfarb MT, Hickman J, Jones TM. Therapeutic studies with new combination benzoyl peroxide, clindamycin gel in acne vulgaris. *Cutis* 2001; 67: 13-20.

5. Shalita A. The integral role of topical and oral retinoids in the early treatment of acne. *J Eur Acad Dermatol Venereol* 2001; 15: 43-49.

6. Mills OH, Rizer R, Berger R. Evaluating the pharmacology of antimicrobial agent in acne therapy. *J Am Acad Dermtol* 2004; 2: 3-5.

7. Thiboutot DM. Endocrinolgical evaluation and hormonal therapy for women with difficult acne. *J Eur Acad Dermatol Venereol* 2001; 15: 57-61.

8. Sykes NL, Webster GF. Acne: a review of optimum treatment. *Drugs* 1994; 48: 59-70.

9. Sharquie KE, al-Turfi IA, al-Salloum SM. The antibacterial activity of tea in vitro and vivo in patients with impetigo contagiosa. *J Dermatol* 2000; 27: 706-710.

10. Amarowicz R, Pegg RB, Bautista DA. Antibacterial activity of Green tea polyphenol against E. coli. *Nahrung* 2000; 44: 60-62.

11. Yee YK, Koo MW. Anti helicobactor pylori activity of Chinese tea in vitro study. *Aliment Pharmacol Ther* 2000; 14: 635-638.

12. Sharquie KE, Al-Turfi IA, Al-Shimary WM. Treatment of acne vulgaris 2% topical tea lotion. *Saudi Med J* 2006; 27: 83-85.

13. Liao S. The medicinal action of androgens and green tea epigallocatechin gallate. *Hong Kong Med J* 2001; 7: 369-374.

14. Robert MR. Vitamins and trace element deficiency and excess. In: Harrison's Principle of Internal Medicine. 16th ed. NewYork (NY): McGraw-Hill Companies Inc.; 2005. p. 403-411.

15. Buist N, Steiner R. Disorder of metal metabolism. In: Campbell AG, McIntosh N, editors. Oxford (UK): Churchill Livingstone; 1998.

16. Rostan EF, DeBuys HV, Madey DL, Pinnell SR. Evidence supporting zinc as an important antioxidant for skin. *Int J Dermatol* 2002; 41: 606-611.

17. Sharquie KE, Al-Azzawi KK. Intralesional Therapy of Cutaneous Leishmaniasis with 2% zinc sulfate solution. *J Pan-Arab League Dermatol* 1996; 7: 41-49.

18. Sharquie KE, Al-Nuaimy AA. Treatment of Viral Warts by Intralesional Injection of Zinc Sulfate. *Ann Saudi Med* 2002; 22: 26-28.

19. Sharquie KE, Khorsheed AA, Al-Nuaimy A. Topical zinc sulphate solution for treatment of viral warts. *Saudi Med J* 2007; 28: 1428-1421.

20. Al-Tereihi IG. Topical 10% zinc sulphate solution in the treatment of superficial fungal infections. [Thesis]. Baghdad, Iraq. Iraqi Board for Medical Specializations (Dermatology and Venereology); 2006.

21. Sharquie KE, Al-Dori WS, Sharquie IK, Al-Nuaimy AA. Treatment of Pityriasis Versicolor with Topical 15% Zinc Sulfate Solution. In: 15th Congress of the European Academy of Dermatology and Venereology. 2006, abstract number: 950962. *Iraqi Journal of Community Medicine* 2008; 20: 64-66.

22. Sharquie KE, Najim RA, Farjou IB, Al-Timimi DJ. Oral zinc sulphate in the treatment of acute cutaneous leishmaniasis. *Clin Exp Dermatol* 2001; 26: 21-26.

23. Al-Gurairi FT, Al-Waiz M, Sharquie KE. Oral zinc sulphate in the treatment of recalcitrant viral warts: randomized placebo-controlled clinical trial. *Br J Dermatol* 2002; 146: 423-431.

24. Sharquie KE, Najim RA, Al-Salman HN. Oral zinc sulfate in the treatment of rosacea: a double-blind, placebo-controlled study. *Int J Dermatol* 2006; 45: 857-861.

25. Clemmensen OJ, Siggaard-Andersen J, Worm AM, Stahl D, Frost F, Bloch I. Psoriatic arthritis treated with oral zinc sulphate. *Br J Dermatol* 1980; 103: 411-415.

26. Dreno B, Amblard P, Agache P, Sirot S, Litoux P. Low doses of zinc gluconate for inflammatory acne. *Acta Derm Venereol* 1989; 69: 541-543.

27. Cochran RJ, Tucker SB, Flannigan SA. Topical zinc therapy for acne vulgaris. *Int J Dermatol* 1985; 24: 188-190.

Related topics

Sharquie KE, Al-Turfi IA, Al-Shimary WM. Treatment of acne vulgaris with 2% topical tea lotion. *Saudi Med J* 2006; 27: 83-85.

Al Robaee AA. Prevalence, knowledge, beliefs and psychosocial impact of acne in University students in Central Saudi Arabia. *Saudi Med J* 2005; 26: 1958-1961.

Al-Hoqail IA. Knowledge, beliefs and perception of youth toward acne vulgaris. *Saudi Med J* 2003; 24: 765-768.