ORIGINAL ARTICLE

Effectiveness of 5% topical zinc sulfate solution in reduction of acne vulgaris - a study from a tertiary care hospital of Lahore

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ABSTRACT

Background and Objective: Acne vulgaris is a common skin condition caused by excessive sebum production, bacterial colonization, and inflammation. The study aimed to determine the effect of the 5% topical zinc sulfate solution on reducing the Global Acne Grading System (GAGS) score in patients with acne vulgaris.

Methods: This descriptive cross-sectional study was conducted in the Department of Dermatology Jinnah Hospital, Lahore, from August 1, 2019, to February 1, 2020. A total of 100 participants fulfilling the inclusion criteria were enrolled. Pretreatment photographs were taken, and the baseline GAGS score was documented. Each patient was instructed to use 5% topical zinc sulfate twice daily on the affected area for 2 months. Compliance was assured by follow-up after every 15 days. The participants were followed up for 2 months to assess the changes in the GAGS score. The collected data was analyzed by using Statistical Package for the Social Sciences version 25.0. A *p*-value of 0.05 was considered to be significant.

Results: A total of 100 participants suffering from acne vulgaris were included. The mean age of the patients was 28.6 ± 6.5 years. There were 46.0% males and 54.0% females. After 2 months of use of the 5% topical zinc sulfate for acne vulgaris, 26.0% showed a good response whereas 45.0% had fair and 29.0% reported no response.

Conclusion: The 5% zinc sulfate solution demonstrated a significant reduction in the GAGs score. Most responders, particularly those belonging to the disease grades I and II, exhibited a significant therapeutic response, suggesting it to be an effective mode of treatment for patients with mild to moderate acne.

Keywords: Acne vulgaris, dermatology, zinc sulfate, topical solution, Global Acne Grading System (GAGS).

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Introduction

The dermatological symptoms of acne vulgaris include comedones, papules, and pustules. It is primarily caused by the excessive production of sebum, bacterial colonization, and inflammation. Various treatment options are available to manage acne, including topical and systemic therapies. Zinc sulfate solution has emerged as a potential treatment for acne vulgaris due to its antimicrobial, anti-inflammatory, and sebum-regulating properties.[1]

Three-fifths to more than 90% of adolescents suffer from acne vulgaris, and 50% continue to experience symptoms as adults.[2] Acne vulgaris is associated with a high degree of psychological, social, and physical morbidity. To enhance the quality of life for patients suffering from this disease, rapid and efficient therapy is required.[3]

Therapies targeting acne vulgaris now attempt to stop the disease at various points in its etiology. Disease severity, place of involvement, patients' age, and individual preference all play a role in determining the best course of treatment.[4] Both topical and oral treatments are used. In mild to severe acne vulgaris, topical treatment alone can be effective.[5]

Topical treatments for acne include topical antibiotics, antibacterial agents, retinoids, and comedolytics like salicylic acid.[1] However, several unwanted side effects, including dryness, peeling, erythema, prenatal abnormalities, and embolic events, have been linked to these therapies.[6] Zinc

sulfate has demonstrated antimicrobial activity against *Propionibacterium* acnes, the bacteria commonly associated with acne vulgaris, and has the potential to inhibit the production of pro-inflammatory cytokines, which reduces inflammation and prevents the formation of acne lesions. Zinc sulfate has been found to regulate sebum production by inhibiting the enzyme 5-alpha-reductase that stimulates sebum production.[7-9]

The effectiveness of a topical zinc sulfate solution (5% concentration) in treating acne vulgaris is little understood, and there is limited data available in Pakistan. Topical therapy with little adverse effects, like zinc sulfate solution, is readily accessible and cheap.

Therefore, this study was conducted to find the effectiveness of a 5% zinc sulfate solution in treating acne vulgaris using the Global Acne Grading System (GAGS) score.[10]

Methods

A descriptive cross-sectional study was conducted in the Dermatology Unit-I of Jinnah Hospital, Lahore, Pakistan, from August 1, 2019, to February 1, 2020, with the approval of the Institutional Review Board of Jinnah Hospital, Lahore. A consecutive sampling technique was employed, and a sample size of 100 participants was determined using a 95% confidence interval, 7% margin of error, and 15% expected percentage of a good outcome.[6]

The inclusion criteria included patients between 18 and 40 years presenting with mild to severe acne vulgaris whereas exclusion criteria comprised patients on oral/topical steroids, patients with a known allergy to zinc, and patients who had taken any oral or topical medication for acne within the previous 3 months.

Patients' histories, physical examinations, and demographic information were recorded on a pre-designed structured proforma[11] following informed consent. Pretreatment photographs were obtained after obtaining informed consent, and a baseline GAGS score was recorded. Each patient was instructed to use 5% topical zinc sulfate solution in an aqueous base dispensed by a single pharmacy twice daily for 2 months on the affected area. Compliance was assured by follow-up after every 15 days. After 2 months of treatment, patients were assessed for a reduction in GAGS scores.

Statistical analysis

The collected data was analyzed by using Statistical Package for the Social Sciences version 25.0. For quantitative variables such as age, pretreatment, and post-treatment scores, mean and standard deviation were computed. Percentages and frequencies were calculated for qualitative variables such as gender and acne vulgaris severity (mild/ moderate/severe). The chi-square test was employed to determine the statistical significance. A *p*-value of 0.05 was considered to be significant.

Results

A total of 100 acne vulgaris patients were investigated. This study included participants aged between 18 and 40 years, with a mean age of 28.6 ± 6.5 years. The frequencies of age categories, gender, disease severity, and treatment effects are detailed in Table 1. Most of the patients (57.0%) were between 18 and 30 years old. The disease severity of grade III was found in 41.0% of the patients. Most patients (45.0%) responded adequately to topical zinc 5% (Table 1).

There was no significant difference in the effect of 5% topical zinc sulfate on males and females (p = 0.155). Moreover, no statistically significant difference was found between age groups (p = 0.659) regarding the effectiveness of 5% topical zinc sulfate solution therapy. There was, however, a statistically significant difference noted in the efficacy of 5% topical zinc sulfate between disease grades (p = 0.000001). It was noted that as grades of disease decreased by the therapy, the effect of 5% topical zinc sulfate on acne vulgaris also increased (Table 2).

Discussion

Acne vulgaris affects a significant proportion of the global population, predominantly adolescents and young adults. The condition not only has physical implications but also affects an individual's self-esteem and quality of life. Various treatment modalities have been employed to manage acne vulgaris, including topical medications, systemic therapies, and procedural interventions.[12,13] Acne prevalence ranges from 35% to over 90% among teenagers and these typically resolve by the end of the teen years but can persist or develop in maturity.[14] Post-adolescent acne primarily affects females, as opposed to adolescent acne, which predominantly affects males.[15]

Table 1. *Frequency distribution of gender, age, disease severity, and effect of treatment among n = 100 patients.*

Variables		Frequency	Percent
Gender	Male	46	46.0
	Female	54	54.0
Age groups	18-30 years	57	57.0
	31-40 years	43	43.0
Severity of disease (GAGS)	Grade-I	29	29.0
	Grade-II	24	24.0
	Grade-III	41	41.0
	Grade-IV	6	6.0
Effect of treatment	No response	29	29.0
	Moderate response	45	45.0
	Good response	26	26.0

Table 2. *Effectiveness of treatment with respect to gender, age groups, and severity of disease among n = 100 patients with acne vulgaris.*

Variables		Effect			Total	*p*-value*
		No response	Moderate	Good		
Gender	Male	9	23	14	46	0.155
		19.6%	50.0%	30.4%	100.0%	
	Female	20	22	12	54	
		37.0%	40.7%	22.2%	100.0%	
Age groups	18-30 years	18	26	13	57	0.659
		31.6%	45.6%	22.8%	100.0%	
	31-40 years	11	19	13	43	
		25.6%	44.2%	30.2%	100.0%	
Disease severity (GAGS)	Grade-I	0	13	16	29	<0.001
		0.0%	44.8%	55.2%	100.0%	
	Grade-II	0	15	9	24	
		0.0%	62.5%	37.5%	100.0%	
	Grade-III	24	16	1	41	
		58.5%	39.0%	2.4%	100.0%	
	Grade-IV	5	1	0	6	
		83.3%	16.7%	0.0%	100.0%	

**Chi-square test.*

In their analysis of 125 acne patients, Alanazi et al.[16] found that the average age of presentation for acne vulgaris was 19 years for men and 18 years for females. According to the current survey findings, the majority (57%) of participants fall within the age range of 18-30 years. Patients in the present research with acne vulgaris were between the ages of 18 and 40 years, with 46% males and 54% females. These results were consistent with the results of a previous study conducted by Samuels et al.[17] Literature has shown a male-to-female ratio in acne vulgaris patients of 1.75:1.04.[18] In a study conducted by Serbian researchers, acne vulgaris was seen in 75.7% of the overall sample, and the majority of them were high school and college students, followed by employed individuals (16.6%) and housewives (7.7%), thus highlighting that acne is a medical condition that mostly impacts individuals in their adolescent years.[19]

In the current study, most respondents (41%) were suffering from acne of grade III severity, whereas 29% had acne of grade I severity. Comedone was the most prevalent lesion followed by pustules and papules. The findings of this study were in line with the findings of Brumfiel et al.[20]

A study by Adityan and Thappa[21] found that acne with grade I severity was the most common (60.2%), followed by grade II (27.5%), III (2.6%), and IV (9.7%). Similarly, Biswas et al.[22] also concluded that grade II was the most common (45%), followed by grades III (16%) and IV (7%). The findings of the current study show contrary results with these two studies; this disagreement could be due to the limited treatment options as well as esoteric home remedies used by the patient which often led to the worsening of the disease in our population.

Acne lesions often manifest in sebaceous glands linked to vellus hair which are triggered by variations in type 1, 5-alpha reductase activity in sebaceous glands.[23] Scarring from acne is shown to be more common in those patients whose condition had been active for longer. This is a typical finding that has been documented in the literature.[24,25] In the current investigation, when 5% topical zinc sulfate solution showed no response in 29.0% of the respondents, 45.0% and 26.0% had fair and good responses, respectively. A study in Saudi Arabia evaluated the effect of 5% topical zinc sulfate solution in patients suffering from acne vulgaris and reported that 35% of the patients showed less than 10% reduction, 50% of patients showed 10%-50% reduction, and 15% showed more than 50% reduction in papules and pustules after 2 months of treatment.[26] Combination drug regimen and dietary modifications may therefore augment the response of topical zinc solutions in patients with severe degree of acne lesions.[27]

Conclusion

Mild to severe cases of acne vulgaris can be effectively treated with a topical zinc sulfate solution of 5% strength as compared to the ones with severe grade of the disease.

Limitations of the Study

The study was conducted in a single tertiary care hospital in Lahore and the results may not be generalizable to other populations or settings. Moreover, the study was cross-sectional and no long-term effects or recurrence of acne was noted and therefore requires follow-up studies. Factors such as diet, stress levels, usage of other skincare products, or hormonal variations were not accounted for and could influence the results. More extensive studies should be done, comparing the topical therapy to standard care and including extended follow-up periods.

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List of Abbreviation

GAGS Global Acne Grading System

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

The study was approved by the Institutional Review Board of Jinnah Hospital, Lahore, Pakistan, vide reference no: DER-2018/055-873, dated January 19th, 2018.

Authors' contributions

AA and MQ: Substantial contributions in conception, drafting of the manuscript; critical revision of the article for important intellectual content.

AG: Substantial contributions in drafting of the manuscript, and critical revision of the article for important intellectual content.

SK and MJ: Substantial contributions in data collection and data interpretation, critical revision of the article for important intellectual content.

ALL AUTHORS: Approval of the final version of the manuscript to be published.

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