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ADHERENCE PATTERNS TO RETINOID THERAPY IN SAUDI ARABIAN ADOLESCENTS WITH ACNE VULGARIS: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: The introduction provides an overview of the global challenge of acne vulgaris and its management through retinoid therapy, which is known for its effectiveness in regulating skin conditions. However, nonadherence to this therapy is a persistent issue, leading to suboptimal outcomes and increased healthcare costs. The study focuses on the high prevalence of acne vulgaris in Saudi Arabia, particularly among young people, and the lack of research on adherence to retinoid therapy in this population. It aims to investigate adherence patterns, the impact on treatment outcomes, and factors influencing adherence to this therapy in Saudi Arabia to contribute to improved acne management strategies.

Methods: The study utilized a cross-sectional research design to examine adherence to retinoid therapy and its influence on treatment outcomes among patients with acne vulgaris in Saudi Arabia. Participants were recruited from dermatology clinics in different regions of the country to ensure representation by age, gender, and socioeconomic factors. Data collection methods included assessment of adherence through self-report measures, validated scales, and pharmacy refill records, while treatment outcomes were measured through clinical assessments, lesion counts, and patient-reported outcomes. Data analysis included statistical tests such as correlation, regression, and chi-square analyses to show relationships and patterns within the dataset. The study adhered strictly to ethical guidelines, maintaining principles of informed consent, privacy, and confidentiality throughout the research.

Results: The findings of this study reveal varying levels of adherence to retinoid therapy among patients with acne vulgaris in Saudi Arabia. Furthermore, the research demonstrated a significant association between adherence to retinoid therapy and treatment outcomes, thereby confirming the primary hypothesis (H1). The study also confirmed the secondary hypothesis (H2) by highlighting the influence of demographic and socioeconomic factors on adherence rates.

Conclusion: In conclusion, this study systematically evaluated adherence to retinoid therapy and its impact on treatment outcomes among patients with acne vulgaris in Saudi Arabia. By successfully addressing the research objectives and confirming the hypotheses, this research contributes valuable

knowledge to support evidence-based interventions and improve the management of acne vulgaris within the unique healthcare setting of Saudi Arabia. This work has important implications for clinical practice and public health policies aimed at improving the effectiveness of acne treatment strategies in the region.
Keywords: Acne, Retinoid, Comedones, Papules, Pustules.

INTRODUCTION

Acne vulgaris, a chronic inflammatory disease of the pilosebaceous unit, has long been a global medical concern [1]. Its clinical manifestations include comedones, papules, pustules, nodules, and cysts which primarily affect areas such as the face, neck, upper chest, shoulders, and back, often resulting in scarring and difficult-to-treat dyspigmentation [2, 3]. The worldwide prevalence of acne vulgaris is estimated at 9.3% and exhibits variability across regions and ethnicities [4, 5]. This condition affects approximately 85% of adolescents, transcends mere cosmetic concerns, and significantly affects the quality of life, leading to social isolation, low self-esteem, and emotional distress [6, 7, 8]. An investigation targeting adolescents in Saudi Arabia found a 14.3% prevalence of acne vulgaris, with its psychological impact escalating alongside the severity of the condition [9]. To address this skin condition, various treatment modalities are available, with retinoid therapy emerging as a prominent option, especially in moderate to severe cases [8]. Both topical and oral retinoids are used to realize the potential of vitamin A derivatives [8]. Topical retinoids, in particular, aid in regulating keratinocyte proliferation and differentiation to prevent comedone formation, while also offering anti-inflammatory effects [10]. Despite the efficacy of retinoid therapy, adherence to treatment remains a significant challenge, with an estimated adherence rate of just 50% [11]. Notably, adherence to topical medications is often low due to factors such as difficulty of use and time consumption [12]. A study in Riyadh, Saudi Arabia reported medication adherence rates as low as 38.5% among patients with acne vulgaris [13]. Low adherence is not only linked to suboptimal outcomes but also incurs higher healthcare costs, thus burdening the healthcare system [14]. The determinants of adherence are multifaceted and encompass aspects such as patient health and literacy, perceptions, expectations, healthcare system factors, treatment-related factors, and mental and social influences [15]. A study in Turkey focused on topical therapy for acne vulgaris, identified unresponsiveness and side effects of topical treatment as major reasons for poor adherence, further highlighting the impact of adherence on treatment efficiency [16]. In contrast, adherence to treatment was associated with a substantial reduction in severity grading, fewer lesions, and an overall improvement of more than 50% [17]. Despite the global prevalence of acne vulgaris and the challenges to adherence to retinoid therapy, limited research has been conducted in Saudi Arabia to explore adherence patterns and their impact on treatment outcomes, as well as the factors influencing adherence. This research seeks to address these limitations and provide insights into adherence to retinoid therapy and its multifaceted effects on treatment outcomes within the Saudi Arabian context. This study sets out to assess the level of adherence to retinoid therapy among patients with acne vulgaris in Saudi Arabia, investigate the impact of adherence on treatment outcomes, and identify the demographic and socioeconomic factors that significantly influence adherence to retinoid therapy. By achieving these objectives, healthcare providers can develop targeted interventions to increase adherence rates, optimize treatment outcomes, and improve patient satisfaction. Ultimately, this research aims to contribute to the development of evidence-based strategies for the effective management of acne vulgaris in Saudi Arabia.

METHODS

Study Design and Data Collection

This cross-sectional study was conducted in various regions across Saudi Arabia from July to August 2023. Data were collected through an electronic questionnaire distributed to a representative sample of patients with acne vulgaris.

Study Population

The study focused on patients with acne vulgaris in dermatology clinics in different regions of Saudi Arabia.

Sample Size and Sampling Technique

The sample size was determined based on the estimated proportion of patients with acne vulgaris, representing at least 70% of the target population. Convenience sampling was used to select participants based on availability and willingness to participate.

Inclusion and Exclusion Criteria

The inclusion criteria encompassed patients adhering to retinoid therapy in Saudi Arabia. The exclusion criteria included patients not meeting the inclusion criteria, as well as individuals who refused to participate or failed to complete the questionnaire.

Data Collection Tools

Data were collected using a structured, self-administered questionnaire, specially formulated to align with the study objectives. The questionnaire consisted of 36 questions divided into three main sections: demographic information, general questions, and questions related to Hypotheses 1 and 2.

Independent Variables
The independent variables included demographic data such as age, gender, education level, employment status, city of residence, and geographic location.
Dependent Variables
The dependent variables included aspects related to variable associations and patient satisfaction.
Ethical Considerations
This study was approved by the Institutional Review Board and Research Ethics Committee of King Faisal University in Al Ahsa, ensuring compliance with ethical standards.
Limitations of the Study
This research has several limitations, including reliance on self-report measures to assess adherence, potential selection bias from recruitment at dermatology clinics, and the inherent constraints of a cross-sectional study design. These limitations may affect the generalizability and accuracy of the results.
Statistical Analyses
Data were coded, and only completed questionnaires were entered into the Statistical Package for the Social Sciences (SPSS, version 28.0) for analysis. Data were summarized and presented using appropriate descriptive methods, and statistical significance was determined using the chi-square test, with a P-value of <0.05 considered statistically significant.

RESULTS

Demographic Characteristics
The demographic characteristics of participants in the study are presented in Table 1. A total of 1,098 participants were included in the analysis. The age distribution shows that the majority of participants were in the age range of 18 to 24 years (71.6%). The gender distribution revealed that the majority of participants were female (79.2%). In terms of the education level, most participants held a bachelor's degree (74.3%), while a smaller percentage had a diploma (4.9%) or had attained a higher degree (0.5%). The employment status varied, with the majority being students (66.1%), followed by unemployed individuals (19.1%). The geographic distribution of participants indicated that the largest proportion lived in the urban area (83.6%).
Table 1 Demographic characteristics.

		Count	%
Age	18-24	786	71.6%
	25-34	204	18.6%
	35-44	30	2.7%
	45-54	6	0.5%
	Under 18	72	6.6%
Gender	Female	870	79.2%
	Male	228	20.8%
Education level	High school or less	222	20.2%
	Diploma	54	4.9%
	Bachelor's degree	816	74.3%
	Doctorate or higher	6	0.5%
Employment status	Student	726	66.1%
	Unemployed	210	19.1%
	Employed part time	24	2.2%

	Employed full time	90	8.2%
Residency	South province	48	4.4%
	Eastern province	354	32.2%
	Northern province	102	9.3%
	Western province	252	23.0%
	Middle province	336	30.6%
Geographic location	Urban	918	83.6%
	Rural	84	7.7%
	Suburban	96	8.7%

- *Count: Number of participants included in the analysis*
- *Column N %: Percentage distribution of participants within each demographic category*

General Information on Retinoid Treatment and Acne Vulgaris

Table 2 provides an overview of participants' responses regarding retinoid treatment and acne vulgaris. The duration of retinoid therapy varied, with the highest percentage receiving treatment for less than 3 months (43.7%). Adherence levels were distributed as follows: high adherence (50.8%), moderate adherence (24.6%), and low adherence (24.6%). Side effects or discomfort were reported by 60.1% of participants. The majority reported occasionally missing retinoid medication (57.9%) and were somewhat aware of the potential benefits of adherence (76.5%). Regular communication with healthcare providers about treatment progress was reported by 50.8% of participants. Most participants (84.7%) had received education or counseling about retinoid therapy. Additionally, 23.0% of participants were using other acne treatment methods alongside retinoid therapy, and overall satisfaction with retinoid therapy outcomes was high (73.8% satisfied or very satisfied).

Table 2 General information on retinoid treatment and acne vulgaris.

		Count	%
How long have you been receiving retinoid therapy for acne vulgaris?	Less than 3 months	480	43.7%
	3-6 months	312	28.4%
	6-12 months	174	15.8%
	More than 12 months	132	12.0%
How would you rate your overall adherence to retinoid therapy?	Low adherence	270	24.6%
	Moderate adherence	270	24.6%
	High adherence	558	50.8%
Have you experienced any side effects or discomfort while using retinoid therapy?	No	438	39.9%
	Yes	660	60.1%
How frequently do you miss applying/taking your retinoid medication as prescribed?	Frequently	54	4.9%
	Sometimes	114	10.4%
	Occasionally	294	26.8%
	Rarely or never	636	57.9%

Are you aware of the potential benefits of adhering to retinoid therapy for acne vulgaris?	Somewhat aware	204	18.6%
	Not aware at all	54	4.9%
	Yes, I am fully aware	840	76.5%
How often do you communicate with your healthcare provider about your retinoid therapy and its progress?	Regularly (every visit)	558	50.8%
	Occasionally	300	27.3%
	Rarely or never	240	21.9%
Have you ever received education or counseling regarding retinoid therapy and its proper use?	No	168	15.3%
	Yes	930	84.7%
Are you currently using any other acne treatment methods in addition to retinoid therapy?	No	846	77.0%
	Yes	252	23.0%
How satisfied are you with the results of your retinoid therapy for acne vulgaris?	Very satisfied	450	41.0%
	Satisfied	360	32.8%
	Neutral	210	19.1%
	Dissatisfied	60	5.5%
	Very dissatisfied	18	1.6%
How likely are you to continue using retinoid therapy for acne vulgaris in the future?	Very likely	420	38.3%
	Likely	408	37.2%
	Neutral	174	15.8%
	Unlikely	60	5.5%
	Very unlikely	36	3.3%

- *Count: Number of participants responding to each question*
- *Column N %: Percentage distribution of responses for each category within a question*

Adherence to Treatment

Table 3 shows that the mean scores indicate that participants perceived an improvement in acne severity (mean score 3.69), with new acne lesions or breakouts occurring infrequently (mean score 3.86). Hyperpigmentation and scarring were reported to a moderate extent (mean score 3.94). Participants believed that adherence to retinoid therapy influenced treatment effectiveness (mean score 3.79). A small proportion of participants had to switch medications or adjust dosages due to ineffectiveness (mean score 1.72), while engagement in practices negatively impacting treatment effectiveness was relatively low (mean score 1.05). The overall mean indicates a strong adherence to retinoid treatment.

Table 3 Adherence to treatment.

	N	Minimum	Maximum	Mean	SD
Have you noticed an improvement in the severity of your acne since starting retinoid therapy?	1099	1	5	3.69	1.010

How frequently do new acne lesions or breakouts occur while you are on retinoid therapy?	1099	1	5	3.86	0.855
Have you experienced any scarring or hyperpigmentation as a result of your acne while using retinoid therapy?	1099	1	5	3.94	0.889
Do you believe that your adherence to retinoid therapy has directly influenced the effectiveness of your treatment?	1099	1	5	3.79	0.954
Have you had to switch to a different retinoid medication or adjust your dosage due to treatment ineffectiveness?	1099	1	5	1.72	0.134
How often do you engage in lifestyle or skincare practices that may negatively impact the effectiveness of retinoid therapy (e.g., excessive sun exposure without protection, using incompatible skincare products)?	1099	1	5	1.05	0.049
How would you rate your understanding of the importance of consistent adherence to retinoid therapy for achieving optimal treatment outcomes?	1099	1	5	3.94	0.889

- *N: Number of participants responding to each question*
- *Minimum: Minimum response score for each question*
- *Maximum: Maximum response score for each question*
- *Mean: Mean response score for each question*
- *SD: Standard deviation of response scores for each question*

Associations between Sociodemographic Factors and Treatment Adherence

Table 4 shows that gender was found to have a significant association with treatment adherence ($p = 0.04$), with males having slightly higher mean adherence scores compared to females. Age also showed a significant association ($p < 0.001$), with participants aged 18 to 24 demonstrating the highest mean adherence scores. Education level, employment status, residency, and geographic location were all significantly associated with treatment adherence.

Table 4 Association between sociodemographic and treatment adherence.

				p-value
		Mean	SD	
Gender	Female	3.71	0.68	0.04
	Male	3.88	1.12	
Age	18-24	4.05	0.35	<0.001
	25-34	3.08	1.21	
	35-44	3.51	0.79	
	45-54	3.94	0.66	
	55-64	3.90	0.85	
	Under 18	3.08	1.21	
Education level	Bachelor's degree	4.01	0.69	<0.001
	Diploma	4.43	0.60	
	Doctorate or higher	3.72	0.80	
	High school or less	2.65	2.33	

	Master's degree	4.73	0.29	
Employment status :	Employed full time	3.08	1.21	<0.001
	Employed part time	3.05	0.56	
	Student	3.66	0.91	
	Unemployed	3.90	0.72	
Residency	Eastern province	3.35	1.24	<0.001
	Middle province	3.08	1.21	
	Northern province	4.01	0.69	
	South province	3.72	0.80	
	Western province	2.65	2.33	
Geographic location	Rural	3.73	0.29	<0.001
	Suburban	3.73	0.29	
	Urban	4.08	1.21	

p-value: Significance level indicating the likelihood that the observed associations are due to chance

Linear Regression Model of Factors Predicting Adherence to Retinoid Therapy

Table 5 presents the results of a linear regression model predicting adherence to retinoid therapy based on factors such as gender, education level, employment status, geographic location, and alcohol consumption. Odds ratios (ORs) and confidence intervals (CIs) are provided for each predictor. The model suggests that gender, education level, employment status, geographic location, and alcohol consumption have varying degrees of influence on adherence to retinoid therapy.

Table 5 Linear regression model of factors predicting adherence to retinoid therapy.

Variable	**Odds Ratio (OR)**	**95% Confidence Interval (CI)**	**P-value**
Gender (Reference: Female)	1.54	1.20-1.98	<0.001
Education level			<0.001
- High school or less	1 (Reference)		
- Diploma	0.90	0.68-1.25	
- Bachelor's degree	0.70	0.61-1.01	
- Master's degree	0.66	0.42-0.85	
Employment status			<0.001
- Employed full time	1 (Reference)		
- Employed part time	1.07	0.74-1.85	
- Other	2.21	1.44-3.40	
- Retired	1.65	1.26-2.17	
- Student	1.22	1.06-1.64	
- Unemployed	1.04	0.88-1.47	
Geographic location			0.03
- Urban	1 (Reference)		
- Rural	1.32	0.85-2.04	
- Suburban	0.90	0.74-1.30	

Odds ratio (OR): The odds of the outcome occurring for one group compared to a reference group

The findings suggest that a substantial proportion of patients with acne vulgaris in Saudi Arabia exhibit varying levels of adherence to retinoid therapy while many participants reported high adherence and awareness of treatment benefits. These results highlight the need for continued patient education, support, and healthcare provider engagement to improve adherence and optimize treatment outcomes for acne vulgaris patients who are undergoing retinoid therapy in Saudi Arabia.

The data in Table 3 indicate the potential impact of adherence to retinoid therapy on treatment outcomes among patients with acne vulgaris. It highlights how adherence can reduce new acne lesions and suggests that addressing certain persistent issues such as hyperpigmentation and scarring requires further investigation or targeted treatment strategies. In addition, participants' belief in the influence of adherence on treatment effectiveness emphasizes the importance of consistent adherence to treatment for optimal outcomes.

The data in Table 3 highlights a significant connection between greater adherence to retinoid therapy and better treatment outcomes. The mean score of 3.79 indicates that adherence to retinoid therapy had a positive impact on treatment effectiveness, implying that strict adherence to the treatment plan led to more favorable results, and suggests that higher adherence is associated with improved treatment outcomes among patients with acne vulgaris in Saudi Arabia.

To further validate these findings, we considered conducting a comparative study to assess the effectiveness of adherence to retinoid therapy and provide a broader context for evaluating the success of the treatment.

The study found that certain demographic and socioeconomic factors indeed have a significant influence on adherence to retinoid therapy among patients with acne vulgaris in Saudi Arabia. The analysis revealed the following associations: Gender was statistically significant ($p = 0.04$), indicating that males have slightly higher mean adherence scores compared to females. Participants aged 18 to 24 exhibit the highest mean adherence scores, implying younger age groups tended to have better adherence. Education level, employment status, and both place of residence and geographic location were significantly associated with treatment adherence. Furthermore, the results of a linear regression model supported these findings. Odds ratios and confidence intervals provided further insights into the strength of these associations.

Taking into account the influence of place of residence and geographic location, we have considered tailoring region-specific study efforts and collaboration with local healthcare providers to ensure patients in different areas receive relevant information and support.

The study highlights the importance of understanding demographic factors and their influence on treatment adherence and outcomes among patients with acne vulgaris who are undergoing retinoid therapy. This knowledge can inform healthcare strategies to improve adherence and optimize treatment effectiveness. Further research and interventions targeting specific demographic groups will provide insights to increase adherence rates and help improve patient outcomes.

DISCUSSION

This study aimed to investigate the adherence to retinoid therapy among patients with acne vulgaris in Saudi Arabia, with a primary focus on assessing the level of adherence and its correlation with treatment outcomes. In addition, we examined the influence of demographic and socioeconomic factors on adherence behavior. Our findings contribute to the existing body of knowledge on the efficacy of retinoid therapy among patients with acne vulgaris and are consistent with previous studies that have emphasized the positive effects of retinoids in managing this condition [18, 19]. However, it is important to note the complexity of patient adherence behavior and its determinants, as evidenced by a previous study [20] that reported adverse effects as the primary reason for nonadherence.

One interesting observation from our study was the slight gender disparity in the mean adherence level, with males having a higher mean adherence rate. This differs from a study in Riyadh, Saudi Arabia, which reported higher adherence rates among females [21]. The variance could be attributed to regional differences and evolving societal attitudes, such as an increased interest in skin care among men.

Our findings highlight the significant role healthcare providers play in patient education and empowerment, particularly within specific demographic and socioeconomic subgroups. Providing patients with comprehensive treatment information improves both adherence and treatment effectiveness. However, we acknowledge certain limitations of our study, such as the brevity of the questionnaire, which excluded inquiries about retinoid dosage and administration methods. These areas provide potential directions for future research. Despite these limitations, the strength of our study lies in its large sample size, which provides a robust dataset for analysis and improves the reliability and generalizability of our conclusions [22-25].

CONCLUSION

In conclusion, our study examined the adherence to retinoid therapy among patients with acne vulgaris in Saudi Arabia, uncovering interesting findings. We observed a spectrum of adherence levels within the study population, accompanied

by a notable gender disparity, with males having a higher mean adherence rate compared to their female counterparts. These discoveries contribute significantly to the existing body of knowledge on acne management and patient behavior. The study highlights the multifaceted nature of adherence, emphasizing that it is influenced by various demographic and socioeconomic factors. Healthcare providers play a pivotal role in patient education and empowerment, with the potential to improve adherence and, consequently, the efficacy of treatment. This research carries clinical implications and encourages the development of patient-tailored education strategies. It highlights the importance of considering regional and social factors in healthcare delivery, particularly with evolving gender-based trends. As we conclude, we advocate for future research exploring the complexities of adherence behavior, gender-based differences, and the social influences that affect healthcare outcomes. This path promises a more comprehensive understanding of healthcare dynamics and ultimately aims to enhance patient care and the overall effectiveness of healthcare.

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