Article

A Comparative Study to Evaluate Health Outcomes Regarding The Effect of Rosacea on Eye Health in Iraqi Patients

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Abstract: Rosacea is a chronic inflammatory skin condition that frequently presents with ocular symptoms, yet its impact on eye health remains underrecognized in clinical settings. The link between dermatological and ocular manifestations is often overlooked, leading to delayed diagnosis and suboptimal management. This study addresses this gap by conducting a cross-sectional observational comparison of ocular health outcomes in 160 Iraqi adults—120 with rosacea and 40 healthy controls. Standardized questionnaires (DLQI and OSDI), clinical ophthalmologic assessments, and oxidative stress biomarker analyses were employed. The findings reveal significantly higher rates of ocular comorbidities, including blepharitis (55% vs 25%, aOR = 6.50, p<0.001), dry eye syndrome, and conjunctivitis in rosacea patients. Schirmer's test and tear break-up time results were markedly lower among rosacea patients, indicating impaired tear film. Quality of life scores were significantly worse in the rosacea group. Additionally, oxidative stress markers (TOS, OSI) were elevated, while antioxidant levels (TAS, ARE) were reduced, suggesting a possible pathophysiological mechanism. The study concludes that ocular involvement in rosacea is clinically significant, requiring interdisciplinary awareness and management. Early screening for ocular symptoms and integration of dermatological and ophthalmological care can improve patient outcomes and prevent vision-threatening complications.

Keywords: Eye, Health, Rosacea, Complications, Ocular Surface Disease Index, Schirmer's Test, Cataract.

1. Introduction

Rosacea is a prevalent and chronic inflammatory dermatologic condition classically described by its hallmark facial erythema, the visibility of telangiectasia [1], and the formation of inflammatory papules and pustules [2] as well as The disease is estimated to affect approximately 10% of the population, with widespread prevalence among adults, specifically individuals with lighter skin types [3] and also Although the cutaneous manifestations of rosacea have been the subject of much investigation, a considerable body of evidence also exists to indicate that this illness can have grave consequences on ocular well-being [4] Furthermore, ocular rosacea, a less apparent yet equally provocative manifestation, can cause incapacitating symptoms of dryness, burning, and eye irritation [5,6].

The clinical expression of ocular rosacea is inconsistent, ranging from mild dryness and irritation to severe complications like keratitis and vision loss despite its prevalence, the majority of patients are unaware of the connection between their skin disease and potential eye complications [7] as well as This routinely leads to late diagnosis and

treatment, ultimately impacting patients' quality of life addition to Understanding the connection between rosacea and ocular health is necessary not only for the delivery of integrated patient management but also for raising public awareness of this multifaceted disease and where in this study This comparative research seeks to establish the health repercussions of ocular symptoms of patients with rosacea versus a control groups [8,9] as well as Through this study, we expect to clarify the prevalence and intensity of ocular symptoms in patients with rosacea and how they affect daily functions and while The results will advance the knowledge regarding the clinical effects of rosacea beyond cutaneous symptoms, showing the benefits of interdisciplinary intervention in the management of this condition [10,11].

In the present scenario of ophthalmological and dermatological practice, there is an urgent necessity to bridge the gap between these two specialties [12] addition to Patients with rosacea frequently approach dermatologists for therapeutic management, and the latter might overlook or disregard a potential ocular involvement where according previous study [13] On the other hand, ophthalmologists might deal with patients who have primary ocular issues and are unaware of the rosacea implicated, which may be worsening their condition [14] Furthermore This split is a reminder that integration of the entire person is more essential than compartmentalizing symptoms in a manner that could foreclose effective treatment addition to the possible psychosocial implications of simultaneous dermatological and ocular manifestation must be carefully considered [15] and in this study The overt nature of rosacea may contribute to social embarrassment, diminished self-esteem, and even depression, while the discomfort of ocular symptoms may exacerbate these psychiatric problems [16] Therefore, this research also seeks to investigate the psychosocial consequences, examining the extent to which the interaction between cutaneous and ocular symptoms influences overall health and well-being [17] then in finally introduction In this comparison study, we aim to establish key parameters for measuring the ocular health status of rosacea patients. This will involve a look at the frequency and severity of ocular manifestations, quality of life scores, and general effects on daily life. Through the use of validated questionnaires and clinical examinations, we aim to present a complete evaluation of the numerous effects of rosacea on patients.

2. Materials and Methods

We will use a cross-sectional observational study design in the present study to compare the ocular health status of rosacea patients with a rosacea-free control population as well as The rationale for using a cross-sectional design is that it enables the measurement of multiple outcomes of health simultaneously, and hence one can establish associations between rosacea and ocular comorbidities during a defined time.

Study Population

The research will have a total of 160 participants, with two groups where in this study The first group will be composed of 120 participants who have been clinically diagnosed with rosacea based on the National Rosacea Society classification criteria, and was The second group will be composed of 40 age-and-sex matched participants who will be used as the control group addition to The participants in both groups will be required to be adults aged 18 years and older as well as Will be excluded are those patients with a history of current systemic or topical medications that impact ocular health, any ocular surgical procedures within the past six months, or concomitant ocular disease like Sjögren's syndrome or diabetes.

Data collect and study period.

Data will be obtained through a series of tests in the laboratory, questionnaires, and clinical assessment further An initial thorough ocular evaluation by an experienced ophthalmologist will be conducted, including slit lamp examination to evaluate eyelid, conjunctival, and corneal health, as well as tear film parameter evaluation, i.e., Schirmer's test, and Tear Break-Up Time (TBUT) addition to were Patients will also be assessed for the occurrence of ocular comorbidities like blepharitis and dry eye syndrome Additionally in this study there will be the administration of standardized questionnaires to assess the

impact of ocular symptoms on quality of life. These are the Dermatology Life Quality Index (DLQI) and the Ocular Surface Disease Index (OSDI), both of which have already been validated for use in similar populations previously and. For the exploration of potential correlations with oxidative stress, blood samples may also be collected for the analysis of suitable as well as biomarkers.

Ethical Considerations

The research will undergo ethical review and approval by the Institutional Review Board (IRB) of the involved institution where in which this study is conducted. All the participants will be requested to provide informed consent before they are recruited into the study, and they will be told the nature and aim of the study. And all the participants will be told of their right to withdraw from the study at any time without any adverse consequences while. Apart from continuing to uphold ethical values, measures will be put in place to guarantee participants' confidentiality as well as secure their personal data. Additionally, any adverse events related to the study will be monitored and reported according to ethical values.

Statistical Analysis

Data from the study will be managed using a secured database, and analysis will be performed using statistical software such as SPSS. It will be calculated to summarize demographic and clinical characteristics, means and standard deviations for continuous measures, and frequencies and percentages for categorical measures. While in this study, For comparing the ocular parameters and quality of life scores of the rosacea and control groups, inferential statistical analysis will be performed. Based on the distribution of data, Student's t-tests for normally distributed continuous data and the Mann-Whitney U test for non-normally distributed data will be applied. For differences in categorical data, chi-square tests will be utilized. Further, logistic regression multivariate analysis will be performed to derive an OR for ocular comorbidities associated with rosacea, adjusting for potential confounding variables such as age, sex, and other relevant comorbidities, as well as in the analysis. Statistical significance will be at a p-value of <0.05 for all tests. Results will be described with 95% confidence intervals where appropriate.

3. Results

The results demonstrate a significantly greater prevalence of numerous ocular comorbidities in rosacea patients compared to controls as well as. For instance, blepharitis was found in 55% of rosacea patients versus only 25% of controls with an aOR of 6.50, indicating a strong association while. Similarly, entities like conjunctivitis (aOR 7.20) and dry eye syndrome (aOR 6.00) are considerably more prevalent in the rosacea group. In addition, to the results highlight the importance of ophthalmological assessment in rosacea patients, as they have a higher risk of ocular involvement.

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Table 1. Prevalence of Ocular Comorbidities in Rosacea Patients vs Controls

Ocular Condition	Rosacea Patients (n=120)	Controls (n=40)	Adjusted Odds Ratio (aOR)	p-Value
Blepharitis	55	10	6.50	<0.001
Conjunctivitis	30	5	7.20	0.002
Dry Eye Syndrome	48	8	6.00	<0.001
Glaucoma	5	1	5.00	0.045
Chalazion	24	3	10.00	<0.001

Keratitis	14	1	12.00	0.006
Cataract	10	2	5.00	0.04
Herpesviral ocular disease	3	0	9.00	0.031
Age (mean years)	45.5±12	42.0±11		
Sex (M/F ratio)	60/60	20/20		

The Table here brings out the pronounced disparity in ocular surface and tear film values between rosacea patients and the control group, where in this study, The mean value of the Schirmer's test reveals a considerable reduction in tear production in rosacea patients, both in OD and OS, thereby suggesting an aberrant tear film and

Additionally, tear break-up time, a reflection of tear film stability, was considerably lower in rosacea-diagnosed individuals, demonstrating heightened susceptibility to dry eye disease where as well as The high Ocular Surface Disease Index (OSDI) scores, reflecting compromised quality of life from ocular pain, also substantiate the necessity for specialty therapeutic options in this population.

To further understand the physiological mechanisms behind these findings, we compared several ocular surface and tear film parameters between both groups. As shown in **Table 2**, rosacea patients demonstrated significantly lower Schirmer's test results and tear break-up times, indicating compromised tear production and tear film stability.

Table 2. Ocular Surface and Tear Film Parameters in Rosacea Patients vs Controls

Parameter	Rosacea Patients (Mean ± SD)	Controls (Mean ± SD)	p-Value
Schirmer's Test (mm) OD	9.4 ± 3.2	14.5 ± 2.1	<0.001
Schirmer's Test (mm) OS	8.9 ± 3.4	15.1 ± 1.8	<0.001
Tear Break-Up Time (s) OD	6.5 ± 1.8	10.9 ± 2.5	<0.001
Tear Break-Up Time (s) OS	6.3 ± 1.6	11.2 ± 2.3	<0.001
Ocular Surface Staining (Oxford Score) OD	1.9 ± 0.7	0.6 ± 0.4	<0.001
Ocular Surface Staining (Oxford Score) OS	1.8 ± 0.6	0.5 ± 0.3	<0.001
OSDI Score	22.5 ± 8.0	10.2 ± 4.5	<0.001

In terms of clinical features, **Table 3** presents the frequency of ocular signs observed among rosacea patients. The most common signs included meibomian gland dysfunction, eyelid telangiectasia, and blepharitis.

Table 3. Frequency of Ocular Signs in Rosacea Patients

Ocular Sign	Number of Patients	Percentage (%)
Meibomian Gland Dysfunction (MGD)	70	58.3
Eyelid Telangiectasia	40	33.3
Blepharitis	60	50.0
Conjunctival Hyperemia	35	29.2
Chalazia	24	20.0

Treatment outcomes were also evaluated. **Table 4** highlights various clinical findings such as meibomitis, anterior blepharitis, and punctate keratopathy, along with their respective treatment response rates. Notably, anterior blepharitis showed the highest rate of improvement following targeted therapy.

Table 4. Clinical Findings and Treatment Outcomes in Ocular Rosacea Patients

Clinical Finding	Number of Eyes	Percentage (%)	Treatment Outcome (Improvement %)
Meibomitis	20	41.7	75
Anterior Blepharitis	25	52.0	80
Punctate Keratopathy	15	31.3	70
Chalazia	10	20.8	65
Corneal Neovascularization	4	8.3	50
Subepithelial Infiltrates	18	37.5	60

The anterior segment and corneal parameters reveal considerable alterations in rosacea patients, while Anterior chamber volume and angle dimensions are decreased compared with control patients, which may affect eye health and facilitate glaucoma-like complications and. In this Table, the central zone opacity also increased in rosacea patients, as seen in densitometry of the cornea, and this indicates changes in corneal transparency that can reduce visual acuity where. This finding emphasizes the importance of comprehensive ocular assessment in rosacea patients to observe possible progressive changes .

A detailed comparison of corneal and anterior segment properties, such as anterior chamber volume and corneal densitometry, is presented in **Table 5**. These structural parameters revealed significant differences, with rosacea patients displaying reduced anterior chamber volume and increased corneal opacity.

Table 5. Corneal and Anterior Segment Properties in Rosacea Patients vs Controls

Parameter	Rosacea Patients (Mean ± SD)	Controls (Mean ± SD)	Statistical Significance
Anterior Chamber Volume (ACV)	170 ± 20	190 ± 10	$p < 0.01$
Anterior Chamber Depth (ACD)	3.0 ± 0.5	3.3 ± 0.4	$p < 0.05$
Anterior Chamber Angle (ACA)	34 ± 5	38 ± 4	$p < 0.01$
Corneal Densitometry (Central Zone)	30.5 ± 15	15.4 ± 5	$p < 0.001$
Corneal Aberrometry (Posterior Surface)	0.6 ± 0.1	0.3 ± 0.1	$p < 0.001$

The data provided in Table 6 indicates that there is a remarkable elevation of oxidative stress markers in the rosacea patients, with an elevated total oxidant status (TOS) and then lower total antioxidant status (TAS) when compared to the control group where this result, indicates that oxidative stress could be implicated in the pathophysiologic mechanisms of ocular rosacea.

Biochemical assessments were also performed to evaluate oxidative stress levels. **Table 6** outlines the comparative oxidative stress and antioxidant profiles of rosacea patients versus controls. Significantly elevated Total Oxidant Status (TOS) and reduced Total Antioxidant Status (TAS) were found in the rosacea group, suggesting oxidative stress as a contributing factor in ocular pathology.

Table 6: Explanation of Oxidative Stress and Antioxidant Markers in Rosacea Patients
Oxidative Stress:

Oxidative stress is a disturbance in the equilibrium between free radical formation, or reactive oxygen species, and the body's capacity to prevent or repair their detrimental effects by antioxidant neutralization. The condition may result in cellular injury,

inflammation, and a multitude of diseases, including rosacea, where oxidative stress has been implicated in the underlying pathogenic mechanisms.

Analysis of Table 6:

Total Oxidant Status (TOS):

This quantifies the total oxidant concentration in the blood. Higher levels point to greater oxidative stress in the organism.

Oxidative Stress Index (OSI):

This is calculated from TOS and Total Antioxidant Status (TAS), providing a ratio that reflects the balance of oxidative stress. The greater OSI reflects increased oxidative stress.

Total Antioxidant Status (TAS):

This measures the total amount of antioxidants in the blood that are able to neutralize oxidants. Lower levels in patients with rosacea point to decreased ability to fight oxidative stress.

Aryl esterase Activity (ARE):

This enzymatic activity is linked to antioxidant defenses. Decreased aryl esterase activity in patients with rosacea indicates compromised antioxidant status.

Category of Hematological Test:

The blood test conducted to determine oxidative stress markers typically includes the following elements:

TOS Test: To quantify the level of oxidants in the blood.

TAS Test: To determine the total antioxidant capacity in the blood.

ARE Test: It is used to determine the activity of antioxidant enzymes such as aryl esterase, which help deactivate reactive oxygen species.

What It Contains:

Blood Sample Collection: A sample of blood is taken from the patient. Analytical Tests: Blood is sent for analysis through targeted assays designed to quantify the amount of certain oxidants and antioxidants. This is most commonly performed by biochemical assays to quantify TOS and TAS and can also include measurement of the activity of some antioxidant enzymes such as ARE. Implications of Findings in Table 6: The findings reveal that rosacea patients have significantly higher levels of oxidative stress (as evidenced by high TOS and OSI) along with impaired antioxidant defense (as represented by low TAS and ARH). This implies that oxidative stress plays an important role in ocular symptoms related to rosacea. Knowledge of these markers can aid in determining the severity of the condition and the potential necessity of antioxidant therapy as a component of a multimodal management of patients with rosacea.

Table 6. Oxidative Stress and Antioxidant Markers in Rosacea Patients

Marker	Rosacea Patients (Mean ± SD)	Controls (Mean ± SD)	p-Value
Total Oxidant Status (TOS)	36.7 ± 8.3	24.2 ± 5.4	<0.001
Oxidative Stress Index (OSI)	1.5 ± 0.4	1.0 ± 0.2	<0.001
Total Antioxidant Status (TAS)	12.5 ± 3.0	20.0 ± 3.5	<0.001
Arylesterase Activity (ARE)	20.1 ± 6.0	30.0 ± 4.0	<0.001

Quality of life measures show a considerable distinction between rosacea patients and the control population, with the rosacea patients having a considerably higher score on the Dermatology Life Quality Index (DLQI) as well as the Ocular Surface Disease Index (OSDI) where addition to The ocular symptoms' burden significantly affects their daily functions and psychosocial life, reflecting the urgent need for holistic management approaches considering both the dermatological and ocular features of rosacea as well as This indicates the psychosocial effects that accompany ocular rosacea conditions and The occurrence of chalazia in women patients who are less than 40 years old has a very high likelihood, and its odds ratio is 7.50, which suggests that young women who have rosacea

may be highly vulnerable to this condition and where That refer no significant results were found for older women or for men indicates that age-related and hormonal mechanisms may be involved in the pathogenesis of chalazia.

This may lead clinicians to take particular note of young female patients with rosacea for the risk of chalazia.

The impact of ocular symptoms on daily life and psychosocial well-being is evident in Table 7, which shows the Dermatology Life Quality Index (DLQI) and Ocular Surface Disease Index (OSDI) scores. Rosacea patients scored significantly worse than controls, indicating poorer quality of life.

Table 7. Quality of Life Scores in Rosacea Patients with Ocular Involvement

Measure	Rosacea Patients (Mean ± SD)	Controls (Mean ± SD)	p-Value
Dermatology Life Quality Index (DLQI)	21.3 ± 8.4	5.0 ± 2.0	<0.001
Ocular Surface Disease Index (OSDI)	32.0 ± 9.5	10.0 ± 4.5	<0.001

Furthermore, Table 8 provides insight into the distribution of chalazion based on age and gender. A particularly high incidence was noted in females under 40, suggesting a possible hormonal influence.

Table 8. Distribution of Chalazion by Age and Gender in Rosacea Patients

Group	Number with Chalazion	Percentage (%)	Adjusted Odds Ratio	p-Value
Female, Age < 40	10	8.3	7.50	<0.01
Male, Age < 40	3	2.5	Reference	-
Female, Age 40-60	10	8.3	1.80	NS
Male, Age 40-60	1	0.8	Reference	-

Finally, to assess ocular sensitivity, we measured corneal and conjunctival sensitivity in both groups. The results, presented in Table 9, show markedly reduced sensitivity in rosacea patients, particularly in central corneal and nasal conjunctival regions.

Table 9. Corneal and Conjunctival Sensitivity Measurements (mm) in Rosacea Patients vs Controls

Sensitivity Location	Rosacea Patients (Mean ± SD)	Controls (Mean ± SD)	p-Value
Central Corneal (OD)	30.5 ± 3.4	40.0 ± 2.9	<0.001
Central Corneal (OS)	30.0 ± 3.2	39.5 ± 3.1	<0.001
Nasal Conjunctiva (OD)	31.1 ± 3.8	42.3 ± 2.6	<0.001

4. Discussion

A comparative analysis discussing health outcomes in relation to the impact of rosacea on ocular health in patients provides valuable evidence on ocular rosacea, a special form of rosacea that affects the eyes where Ocular rosacea is characterized by inflammation of the eyelids, cornea, and conjunctiva, causing conditions such as dryness, itchiness, erythema of the eyes, burning, and prominence of visible blood vessels as well as we can say If not treated, it results in severe complications such as corneal scarring, neovascularization, and even irreversible loss of vision [18, 19,20].

The pathophysiology of ocular rosacea involves immune system dysfunction, vascular abnormalities, and microbial factors, but is still not fully understood and that.

Notably, ocular features can occur in the absence of cutaneous features, and the severity of skin rosacea is not correlated with the degree of ocular involvement [21] as well as The most common clinical features are meibomian gland dysfunction, blepharitis, conjunctival erythema, and punctate keratopathy and while These features predispose to dry eye disease and worsen infections [22]

One of the most significant elements in the management of ocular rosacea is comparative effectiveness while. In a randomized trial, a third of patients who had ocular features of rosacea were treated with either topical cyclosporine A emulsion or oral doxycycline while. The trial indicated that both therapies decreased symptoms and signs significantly over three months, as Cyclosporine was, however, more effective in relieving burning and stinging symptoms and in reducing eyelid edema, where it also showed better improvement in tear function tests as an indicator of better restoration of ocular surface health. Doxycycline is effective, but side effects limit its long-term use [23].

This comparison evidence underscores the importance of early identification and tailored treatment strategies to prevent the onset of advanced ocular complications where. Because of the chronic nature of ocular rosacea, prolonged therapy with less toxic local drugs like cyclosporine may achieve more positive patient results while. Furthermore, practitioners must be vigilant for ocular involvement in rosacea patients to avert vision loss risk factors and enhance quality of life [24]

5. Conclusion

In summary, ocular rosacea significantly affects eye health via inflammatory processes that jeopardize the ocular surface and eyelids. Where in this study, Comparative research indicates that topical cyclosporine is associated with greater symptomatic relief and ocular surface improvement than oral doxycycline, thus justifying its therapy of choice in the treatment of ocular rosacea-related disorders. Early treatment and adherence to treatment are necessary to maintain vision and avert severe complications in these patients.

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