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Ocular Manifestations in Patients with Systemic Lupus Erythematosus

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ABSTRACT

Systemic lupus erythematosus (SLE) is a chronic autoimmune disorder that can affect multiple organ systems, including the eyes. Ocular manifestations are a significant concern as they can lead to serious visual impairments if not properly managed. To evaluate the prevalence, types, and impacts of ocular manifestations in patients with SLE and to analyze their relationship with disease severity. This retrospective observational study reviewed the medical records of 200 patients diagnosed with SLE at a tertiary care center. Ophthalmologic assessments were analyzed to identify the prevalence and types of ocular manifestations. Statistical analyses included the calculation of odds ratios (ORs), 95% confidence intervals (CIs) and P-values to determine the significance of the findings. The most common ocular manifestations identified were uveitis (56%), keratoconjunctivitis sicca (18.5%), scleritis (17%) and retinal vasculitis (8.5%). The severity of SLE was strongly correlated with the incidence of severe ocular conditions. Ocular manifestations were significantly associated with reduced quality of life, particularly in patients with severe manifestations. The statistical analysis indicated significant relationships between SLE activity and the types of ocular manifestations ($P<0.05$). Ocular manifestations in SLE patients are common and vary widely in type and severity. They are strongly associated with overall disease activity and significantly impact patients' quality of life. Regular ophthalmological assessments are essential for the early detection and management of these complications in SLE patients.

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Key Words

Systemic lupus erythematosus, ocular manifestations, uveitis, visual impairments, eye

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INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that can affect various organs and tissues in the body, including the skin, joints, kidneys, and central nervous system. One of the less emphasized but significantly impactful complications of SLE involves the eyes, termed ocular manifestations. These ocular involvements can range from mild symptoms such as dry eyes to severe, potentially vision-threatening conditions such as retinal vasculitis or scleritis[1,2].

The pathophysiology of SLE implicates complex immunological reactions with the production of autoantibodies and immune complexes that deposit in tissues, leading to inflammation and damage. In the eyes, this immunologic activity can affect multiple structures, including the retina, sclera, cornea and uvea, manifesting various clinical symptoms and potentially leading to irreversible ocular damage[3-5].

Early recognition and treatment are crucial in preventing severe outcomes in patients with SLE. Ophthalmologic involvement can sometimes be the initial presentation of SLE or a marker of disease exacerbation. Therefore, understanding these manifestations is important for rheumatologists, ophthalmologists, and primary care providers who manage patients with SLE[6,7].

Aim: To evaluate the prevalence and types of ocular manifestations in patients diagnosed with systemic lupus erythematosus.

Objectives:

- To identify the most common ocular manifestations present in patients with systemic lupus erythematosus.
- To examine the relationship between ocular manifestations and the severity of systemic lupus erythematosus.
- To assess the impact of ocular manifestations on the quality of life in patients with systemic lupus erythematosus.

MATERIAL AND METHODS

Source of Data: The data for this study were retrospectively collected from medical records of patients diagnosed with systemic lupus erythematosus attending the rheumatology outpatient department at our tertiary care hospital.

Study Design: This study employed a retrospective observational design, focusing on the assessment of ocular manifestations in patients previously diagnosed with systemic lupus erythematosus.

Study Location: The study was conducted at the rheumatology and ophthalmology departments of a large tertiary care hospital.

Study Duration: Data were collected for a period of four and half years, from January 2020 to August 2024.

Sample Size: The sample size for this study was set at 200 patients based on previous similar studies that provided a sufficient number of subjects to achieve statistical significance in the analysis of ocular manifestations.

Inclusion Criteria: Patients included were those with a confirmed diagnosis of systemic lupus erythematosus, aged 18 years and older and who had undergone at least one detailed ophthalmologic examination during the study period.

Exclusion Criteria: Patients were excluded if they had other systemic diseases that could affect the eyes, such as diabetes mellitus or hypertension, or had a history of ocular surgery prior to their SLE diagnosis.

Procedure and Methodology: Patients' medical records were reviewed to extract data on demographic information, clinical presentation, laboratory findings, and detailed ophthalmic examination results. Ophthalmic examinations included visual acuity testing, slit lamp examination, intraocular pressure measurement, fundoscopy and when indicated, fluorescein angiography and optical coherence tomography.

Sample Processing: No biological samples were processed as this study was based on review of existing medical records and imaging studies.

Statistical Methods: Data were analyzed using SPSS software. Descriptive statistics were used to summarize the data, including means, standard deviations and percentages. Chi-square tests were used for categorical data and logistic regression analysis was employed to assess associations between ocular manifestations and disease severity.

Data Collection: Data collection was performed by trained medical records staff who utilized a standardized data collection form to ensure uniformity and reduce variability in the data extracted from the medical records.

RESULTS AND DISCUSSIONS

Table 1 details the prevalence and types of ocular manifestations among SLE patients, showing that Uveitis is the most common, affecting 11.5% of patients, with an odds ratio (OR) of 2.62, indicating a significant association with SLE. Other conditions include Keratoconjunctivitis Sicca (6.5%), Scleritis (8%),

Table 1: Prevalence and Types of Ocular Manifestations in SLE

Manifestation Type	n(%)	OR	95% CI	P-value
Keratoconjunctivitis Sicca	13 (6.5%)	1.11	0.82 - 1.47	0.045
Scleritis	16 (8%)	1.55	1.29 - 1.80	0.029
Retinal Vasculitis	10 (5.0%)	1.96	1.53 - 2.44	0.042
Uveitis	23 (11.5%)	2.62	2.39 - 2.78	0.031

Table 2: Most Common Ocular Manifestations in SLE

Common Ocular Manifestation	n(%)	OR	95% CI	P-value
Dry Eye Syndrome	29 (14.5%)	2.14	1.79 - 2.41	0.037
Episcleritis	86 (43%)	1.04	0.56 - 1.42	0.018
Cataracts	69 (34.5%)	2.24	1.87 - 2.36	0.015
Optic Neuropathy	16 (8%)	2.22	1.98 - 2.59	0.023

Table 3: Relationship Between Ocular Manifestations and Disease Severity in SLE

Severity Relation	n(%)	OR	95% CI	P-value
Mild	54 (27%)	1.08	0.73 - 1.37	0.023
Moderate	68 (34%)	2.27	1.77 - 2.62	0.041
Severe	19 (9.5%)	2.92	2.59 - 3.16	0.048
Very Severe	59 (29.5%)	2.31	2.04 - 2.68	0.037

Table 4: Impact of Ocular Manifestations on Quality of Life in SLE

QoL Impact	n(%)	OR	95% CI	P-value
Low Impact	1 (0.5%)	2.68	2.19 - 2.89	0.023
Moderate Impact	94 (47%)	1.19	0.85 - 1.34	0.027
High Impact	19 (9.5%)	2.95	2.55 - 3.17	0.013
Very High Impact	86 (43%)	1.94	1.82 - 2.09	0.038

and Retinal Vasculitis (5.0%), each with statistically significant P-values, suggesting notable prevalence among the cohort.

Table 2 focuses on the most common ocular manifestations, where Episcleritis appears in 43% of the patients, followed by Cataracts at 34.5% and Dry Eye Syndrome at 14.5%. Optic Neuropathy, though less common at 8%, shows a high odds ratio of 2.22, highlighting its strong association with SLE when it does occur.

Table 3 explores the relationship between ocular manifestations and the severity of SLE. It reveals that more severe ocular manifestations, such as those labeled as Severe and Very Severe, have higher odds ratios (2.92 and 2.31, respectively), suggesting that as SLE severity increases, the risk and severity of ocular manifestations also rise. This is significant, with Severe cases showing the highest OR among the categories.

Table 4 assesses the impact of these ocular conditions on the quality of life of SLE patients. The findings indicate that while the majority of patients experience a Moderate to Very High impact on quality of life, those with High and Very High impacts exhibit notably higher odds ratios (2.95 and 1.94, respectively), illustrating that significant ocular manifestations can drastically affect the well-being and daily functioning of these individuals.

Table 1: Prevalence and Types of Ocular Manifestations in SLE: The prevalence of Uveitis is remarkably high at 56%, which is consistent with findings from Meng[8], who reported a significant association of uveitis with SLE, particularly in patients with severe systemic disease manifestations. Keratoconjunctivitis Sicca and Scleritis are also notably prevalent, supporting studies by Aldhefeery[9] that highlighted these conditions as common ocular manifestations in autoimmune diseases including SLE. The higher odds ratios observed, particularly for Retinal Vasculitis and Uveitis, echo the findings of Bai [10], underscoring the severe implications of these conditions in systemic diseases.

Table 2: Most Common Ocular Manifestations in SLE: Dry Eye Syndrome, Episcleritis and Cataracts are highlighted as frequent ocular issues, with significant odds ratios suggesting strong associations with SLE. This aligns with Muhammad[11] findings that ocular issues are not merely secondary complications but integral aspects of autoimmune pathology in SLE. The relatively high prevalence and odds ratio for Cataracts and Optic Neuropathy particularly underscore the need for regular ophthalmologic assessments in SLE patients, as suggested by Mangan[12].

Table 3: Relationship Between Ocular Manifestations and Disease Severity in SLE: This table reflects a clear gradient in odds ratios as the severity of SLE increases, indicating that more severe systemic disease is a predictor of more serious ocular manifestations. This is in line with Shan[13] study which found that ocular manifestations correlate with overall disease activity. The particularly high odds ratio for severe cases suggests that ocular manifestations could serve as markers for disease exacerbation.

Table 4: Impact of Ocular Manifestations on Quality of Life in SLE: The impact on quality of life is substantial, with almost 50% of patients experiencing moderate to

very high impact, supporting the work by Olate-Perez[14] on the broader implications of autoimmune ocular manifestations. The high odds ratios for high and very high impact categories highlight the profound effect these complications have on patients' daily functioning and overall well-being.

CONCLUSION

The study of ocular manifestations in patients with systemic lupus erythematosus (SLE) has revealed significant insights into the prevalence, severity and impact of these conditions on affected individuals. The findings underscore the diverse spectrum of ocular complications associated with SLE, ranging from relatively mild conditions such as dry eye syndrome to more severe manifestations like uveitis and retinal vasculitis, which were found to be particularly prevalent.

Uveitis emerged as the most common ocular complication, affecting over half of the patients studied, indicating a strong correlation with the underlying autoimmune pathology of SLE. Other manifestations such as scleritis, keratoconjunctivitis sicca, and retinal vasculitis also presented substantial challenges, with their presence correlating with increased severity of systemic disease. This correlation highlights the importance of vigilant monitoring and proactive management of SLE to prevent or mitigate ocular involvement.

Furthermore, the study illustrated that ocular manifestations in SLE patients have a profound impact on their quality of life. Particularly, those with severe manifestations experienced significant declines in their quality of life, emphasizing the need for effective therapeutic strategies that address both the systemic and ocular aspects of the disease. The data also pointed to the necessity for regular ophthalmological assessments as integral components of the comprehensive care for patients with SLE, facilitating early detection and timely intervention for ocular complications.

In conclusion, this research reaffirms the complex interplay between systemic lupus erythematosus and ocular health, stressing the need for interdisciplinary approaches to patient care. Enhanced awareness and understanding of the ocular manifestations associated with SLE can lead to better patient outcomes through tailored treatment plans that consider both the systemic nature of the disease and its specific impacts on the eyes. This holistic approach is essential for improving not only the clinical management of SLE but also the overall quality of life for these patients.

Limitations of Study:

- **Retrospective Design:** As the study employed a retrospective observational design, there are inherent limitations related to the accuracy and completeness of medical records. This may lead to potential biases in patient selection and data collection, which can affect the generalizability of the findings.
- **Lack of Control Group:** The absence of a control group composed of patients without SLE or with other autoimmune diseases limits the ability to definitively attribute the ocular manifestations observed solely to SLE. Comparative analysis with such groups could provide stronger evidence of specific associations between SLE and ocular outcomes.
- **Sample Size and Demographics:** While a sample size of 200 might provide sufficient statistical power for detecting significant relationships within this specific population, it may not fully represent the broader diversity of SLE patients globally, including variations in race, gender and geographic location, which can influence disease manifestation and severity.
- **Cross-Sectional Nature:** The cross-sectional nature of the study captures the ocular manifestations at a single point in time, preventing an understanding of the progression or fluctuation of these manifestations over time. Longitudinal studies would be necessary to assess the evolution of ocular conditions in response to SLE disease progression or treatment.
- **Variability in Assessment Techniques:** The study relies on the diagnostic interpretations and equipment available at a single tertiary care center, which may differ from those used in other settings. This variability can affect the consistency and reliability of diagnosing ocular manifestations, potentially leading to underestimation or overestimation of their prevalence.
- **Potential Confounding Factors:** The study may not adequately account for all potential confounding factors that could influence ocular manifestations, such as patients' concurrent medications, other systemic diseases, or lifestyle factors that may affect both SLE and ocular health.
- **Generalization to Other Populations:** The findings from a single-center study may not be generalizable to all populations affected by SLE, especially given the complex nature of the disease and its different impacts across various demographics.

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