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Radiological Features of Intra-Ocular Manifestations in Patients with Hematologic Disorders

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Abstract

Objective: To evaluate radiological features of intra-ocular manifestations in patients with hematologic disorders.
Methodology: This was an observation prospective study conducted through a convenient sampling technique in the Department of Radiology and Ophthalmology, Liaquat University of Medical & Health Sciences, Hyderabad/Jamshoro for a period of one year from November 2023 to October 2024. Patients who had any hematologic disorder (such as anemia, leukemia, lymphoma, and multiple myeloma), and came for ocular examination were included. Baseline and clinical data were collected and radiological features of intra-ocular manifestations in patients with hematologic disorders were observed using SPSS version 26.0.
Results: A total of 61 patients were analyzed. Most common hematological disorders were lymphoma (39.34%), leukemia (31.14%), anemia (16.39), and thalassemia (13.11%). Prevalence of ocular manifestations among patients with hematological disorders was 78.68%. Conjunctival pallorness (n = 6) was common in patients with anemia, retinal hemorrhage in AML (n = 1), ALL (n = 1), CML (n = 1), and CLL (n = 1), corneal ulcers in AML (n = 1), ALL (n = 2), and NHL (n = 02), ptosis in anemia (n = 1) and HL (n = 1), retinal hemorrhage in AML (n = 1), ALL (n = 1), CLL (n = 1), and NHL (n = 1), and optic nerve thickening was common in patients with NHL.
Conclusion: Ocular manifestations were quite common in patients with hematological disorders. Retinopathies are more common among patients with leukemias while in patients with anemia eye dryness and conjunctival pallorness was more prevalent.
Keywords:

Introduction

Hematologic system is crucial in providing nutrients and oxygen to the vital parts of the body. [1] Hematological disorders encompass wide range of diseases including anemia, bleeding disorders, cancers such as leukemia & lymphoma, and disorders affecting white blood cells or platelets.[2] Ocular manifestations in hematological disorders can result from direct infiltration of the eye by disease cells or indirectly due to blood abnormalities or treatment complications.[3] In a study conducted by and colleagues have shown that patients with blood disorders are more likely to have ocular involvement and in some cases like leukemia the ocular involvement may be seen in 90% of the patients.[4]

Most of the patients with hematologic disorders are usually asymptomatic and sometimes ocular manifestations observed accidently while seeking medical attention during follow-up visits for primary disorder.[5] In the majority of these, the ocular surface and retina are most affected in hematological malignancies like leukemia, Hodgkin and non-Hodgkin lymphoma, myeloproliferative, and myelodysplastic syndromes. Conjunctival hemorrhages, intraretinal hemorrhages, and cotton wool spots are common findings.[6] In a study conducted by Koshy J and colleagues[7] from India have observed that leukemic ophthalmic lesions were found in 42/96 (43.8%) patients. Ocular involvement was more often seen in adults, acute and myeloid leukemias. All the primary leukemic manifestations were seen in males. Another study conducted by Dhasmana R and colleagues have observed[8] prevalence of ocular manifestations in patients affected with hematologic disorders were 9.3% furthermore, the most common ocular manifestation was intra-retinal hemorrhage and Roth spots.

Different hematologic disorders lead to different clinical ocular manifestations as observed in previously published studies.[5, 9] To our knowledge there is no study conducted in Pakistan in which ocular manifestations were observed in patients with hematologic disorders. That is why this study aims to determine the radiological features of ocular manifestations in patients presented and radiologically examined for hematologic disorders.

Methodology

This was an observation prospective study conducted through a convenient sampling technique in the Department of Radiology and Ophthalmology, Liaquat University of Medical & Health Sciences, Hyderabad/Jamshoro for a period of one year from November 2023 to October 2024. This study was conducted after the approval taken from ethical board of the hospital and consent from the participants. We included all the patients who had any hematologic disorder (such as anemia, leukemia, lymphoma, and multiple myeloma), and came for ocular examination. Patients with malignancies other than hematologic, patients with known ocular disorders such as diabetic& hypertensive retinopathy, and patients who do not consent to participate were excluded from this study.

Every patient underwent a thorough ocular examination after taking detailed history of disease and clinical manifestations. The examination particularly focusing on the anterior and posterior segments of the eye in which examiner has observed parameters related to intraocular pressure, best-corrected visual acuity, slip lamp examination of the anterior segment, retinal examination after dilation of the pupil, and slip lamp bio microscopy with a Volk 78 D lens. In cases when fundus photography was performed, good results were obtained. Radiological assessment of ophthalmic manifestations was observed through CT scan and or MRI. Complete haematological profile, including peripheral blood smear, bone marrow study (for leukaemia and paraproteinemia), lymph node biopsy (in case of lymphoma), total leucocyte count, differential count, erythrocyte sedimentation rate, platelet count, and haemoglobin levels were obtained and recorded.

A proforma was designed to collect the required data. Data were entered and analysed using statistical package for the social sciences (SPSS version 26.0). Continuous variables were presented as mean±SD and categorical data were presented in the form of frequencies and percentages. To achieve the study's objectives, relevant statistical tests were performed. Such as chi-square and fisher's exact tests where applicable and a p value of <0.05 was considered as statistically significant.

Results

A total of 61 patients were included for final analysis. Their mean age was 29.33±12.47 years and most of the patients were males as compared to females, 59.01% (n = 36) and 40.98% (n = 25), respectively. Also, a slightly higher percentage of the patients were urban dwellers (50.81, n = 31). Table I.

Table I: Baseline and clinical characteristics of study subjects. (N = 61)

Characteristics	Frequency	Percentage
Age - years (Mean±SD)	29.33±12.47	
Gender		
Male	36	59.01
Female	25	40.98
Area of residence		
Urban	31	50.81
Rural	30	49.18
Current smoker		
Yes	5	8.19
No	56	91.8

The most common hematological disorders were lymphoma (39.34%, n = 24) followed by leukemia (31.14%, n = 19), anemia (16.39, n = 10), and thalassemia (13.11%, n = 8). Overall prevalence of ocular manifestations among patients with hematological disorders was 78.68% (n = 48). Table II.

Table II: Distribution of hematological disorders and Ocular manifestations. (N = 61)

Hematological disorders	n (%)	Ocular manifestation
Anemia	10 (16.39)	6 (60)
Thalassemia	8 (13.11)	5 (62.5)
Lymphoma	24 (39.34)	22 (91.66)
Non-hodgkins lymphoma	15 (62.5)	14 (93.33)
Hodgkins lymphoma	7 (29.16)	6 (85.71)
T-cell lymphoma	2 (8.33)	2 (100)
Leukemia	19 (31.14)	15 (78.94)
AML	12 (63.15)	9 (60)
ALL	4 (21.05)	3 (20)
CML	2 (10.52)	2 (100)
CLL	1 (5.26)	1 (100)

In table III & IV we have shown the descriptive frequency of ocular manifestations and radiological features in patients with hematological disorders. Conjunctival pallorness (n = 6) was common in patients with anemia, retinal hemorrhage was observed in patients with AML (n = 1), ALL (n = 1), CML (n = 1), and CLL (n = 1), corneal

Table III: Frequency of intra-ocular manifestations in patients with hematological disorders. (N = 61)

Ophthalmic manifestations	Blood disorders						
	Anemia	AML	ALL	CML	CLL	NHL	HL
Conjunctival pallor	6	2	0	0	0	1	0
Dry eyes	2	2	0	1	0	0	0
Ptosis	1	0	0	0	0	0	1
Strabismus	0	0	0	1	1	0	1
Nystagmus	0	1	0	0	0	0	0
Exophthalamos	0	0	0	0	0	2	0
Corneal ulcers	0	1	2	0	0	2	1

Table IV: Ophthalmic radiological features in patients with hematological disorders. (N = 61)

Radiological features	Blood disorders						
	Anemia	AML	ALL	CML	CLL	NHL	HL
Retinal hemorrhage	0	1	1	1	1	0	1
Optic nerve thickening	0	1	1	0	0	2	0
Optic disc edema	1	1	1	1	0	1	0
Diffuse/nodular mass like infiltration	0	1	1	0	0	0	0
Hyperintense T2 lesions in MRI	0	0	0	1	1	0	2

ulcers were observed in patients with AML (n = 1), ALL (n = 2), and NHL (n = 02), ptosis was observed in patients with anemia (n = 1) and HL (n = 1), retinal hemorrhage was common in AML (n = 1), ALL (n = 1), CLL (n = 1), and NHL (n = 1), optic nerve thickening was common in NHL (n = 02), hyperintense T2 lesion was common in HL (n = 02).

Discussion

Blood or hematological disorders are common entity observed during clinical practice but often neglected, misdiagnosed, or presented late with distributed clinical manifestations. One such organ is eye, which is often missed during evaluation of patients with hematological disorders unless patient complains of worrisome ocular problem. The frequency of ocular problems varies depending upon type of hematological disorder. However, a study conducted by Bouazza M and colleagues [3] in 2022 have observed that more than 90% of the patients with hematological disorder had ocular manifestations. While the range of ocular manifestations falls between 30% to 90% depending upon area of patient's inclusion and type of hematological disorder.[10] On the other hand, in our study, the overall prevalence of ocular manifestations among patients with hematological disorders was 78.68% (n = 48). Which is comparatively less than previously published study. Another recently published study from India has shown prevalence of ocular manifestations was 49.48%.[11] Some studies suggest that countries where leukemia is prevalent, the ophthalmic manifestations are also prevalent due to leukemic infiltrations.[12-14] In our study leukemia is less prevalent as compared to lymphomas, 31.14% and 39.34%, respectively. This could be the most important reasons behind lower prevalence of ocular manifestations among patients with hematological disorders.

In our study, conjunctival pallorness was the most prevalent ocular manifestation followed by dry eyes, cotton wool spots, ptosis, and retinal hemorrhage. While a study conducted by Laimon DN[15] has observed that retinal hemorrhage (19.8%) and Roth spots (17.1%) were the most common ocular manifestations. This findings further confirms by the Mohanty L and colleagues where they found 49.50% of the patients with hematological disorder had retinopathy.[16] In our study, cotton wool spots were prevalent among patients with anemia which is confirms by the previously published literature.[17] While the prevalence of ptosis was higher (14.1%) in a previously conducted study [18] as compared to ours.

This study has certain limitations that should be address in future studies to fill the scientific gap still present after this study. First of all, sample size of the study should be increase with inclusion of multiple centers from different cities to cover all demographic and clinical characteristics of patients. Secondly, other types of blood

disorders should be included along with their duration of disease, therapies they are taking, and complication of the disease in other organs too. Lastly, association of ocular manifestations with severity of hematological disorders should also be done in future studies.

Conclusion

This study concludes that ocular manifestations are quite common in patients with hematological disorders. Retinopathies are more common among patients with leukemias while in patients with anemia eye dryness and conjunctival pallorness was more prevalent.

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