PATTERN OF OCULAR MANIFESTATIONS IN PATIENTS WITH HEMATOLOGIC MALIGNANCIES AT A TERTIARY HOSPITAL, ADDIS ABABA, ETHIOPIA

RESEARCH RESULT

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OPHTHALMOLOGY RESIDENT

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Acronyms

DM- Diabetes Mellitus

GCA- Giant Cell Arthritis

HIV/AIDS- Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

HM-Hematologic Malignancy

PAN- Polyarteritis Nodosa

SLE – Systemic Lupus Erythematosus

TASH- Tikur Anbessa Specialized Hospital

WHO-World Health Organizations

ABSTRACT

Objective: To determine the pattern of ocular manifestations in patients diagnosed with hematologic malignancies at tertiary hospital

Methods: A cross-sectional observational study was done by examining all patients attending hematology unit at a tertiary hospital in Addis Ababa who were diagnosed with hematologic malignancies that was confirmed by a bone marrow biopsy or diagnosed by a hematologist. They underwent comprehensive ophthalmic evaluation. Patients with vascular diseases like hypertension, diabetes mellitus, systemic lupus, HIV/AIDS were excluded from the study. Results were analyzed using chi square test and multivariate regression models.

Result: In this study 80 participants having a hematologic malignancy were involved. Almost thirty-nine percent of the study participants were in the age group of 18-40 with mean and SD of 48.7±18.5 years and the age ranges 18-90 years. The most common hematologic malignancy identified was chronic myeloid leukemia accounting for 30% (n=24) of the participants followed by multiple myeloma (16.25%) and polycythemia vera (13.75%). Nineteen (24%) of the study participants had ocular manifestation/s. The most common manifestation was cataract which affected 16.5% (n=13) of the participants. The second frequent ocular manifestation seen was Vitreous Hemorrhage 6.3%(n=5) and retinal hemorrhages 6.3%(n=5). Majority of the ocular manifestation (21.1%) occurred in those with multiple myeloma followed by chronic myeloid leukemia (15.3%). The multivariate logistic regression revealed that participant whose age >60 years had 3.2 folds increase in occurrence of ocular manifestation compared to age 18-40 years (AOR=3.2, 95%CI=1.36, 5.97) and participants who were from out of Addis Ababa were 2.7 folds increase its ocular manifestation compared to those from Addis Ababa (AOR=2.7, 95%CI=1.82, 8.96).

Conclusion: In this study ocular manifestation of hematologic malignancy was commonly seen in patients with multiple myeloma (21.1%), followed by chronic myeloid leukemia (15.3%), polycythemia vera (15.8%) and acute lymphoblastic leukemia (10.5%). The finding also showed that 24% of the participants had ocular manifestation. Among those manifestations cataract accounted 16.5% (n=13), followed by Vitreous Hemorrhage (6.3%) and Retinal hemorrhage (6.3%) then corneal deposition (2.5 %). The determinate factor of ocular manifestation identified was age of >60 years (AOR=3.2, 95%CI=1.36, 5.97) and residence out of Addis Ababa (AOR=2.7, 95%CI=1.82, 8.96).

Introduction

Hematologic malignancies (HM), frequently termed as blood cancer ,are a group of neoplasms that arise through malignant transformation of bone marrow derived cells.(1) It includes a wide range of myelomas, lymphomas, and leukemias that originate in the cells of the immune and lymphatic system of the body. While some HM are acute and can be rapidly lethal, if untreated, many others are insidiously progressive and become chronic, leading to eventual death. The World Health Organization (WHO) classification of hematologic neoplasms includes tumors of lymphoid, myeloid, histiocytic, and dendritic cell lineages.(2)

In general, in High income countries the overall incidence of hematological malignancies is rising but it is very difficult to describe in a consistent and uniform way of their epidemiological behavior. (3) In the United States, for example, hematological malignancies are the fifth most common cancer group(4) being next to breast, prostate, lung and colorectal cancer.

High-quality cancer registry data, the basis for planning and implementing evidence-based cancer control programs, are not available in most low- and middle-income countries.(5) But it is estimated that hematologic malignancies are the 4th most common cancer diagnosed in adults and the most common in children in Ethiopia .(6)

Before the discovery of bone marrow biopsy, ophthalmologists were regularly consulted to assist in making the diagnosis of leukemia. They looked for leukemic retinopathy, which was often present, although frequently asymptomatic.(7)

Ophthalmic manifestations can be classified into two groups: primary or direct leukemic infiltration and secondary or indirect involvement. The primary or direct leukemic infiltration can have three patterns: anterior segment uveal infiltration, orbital infiltration, and neuro-ophthalmic signs of central nervous system leukemia that include optic nerve infiltration, cranial nerve palsies, and papilledema. The secondary or indirect changes are the result of hematologic abnormalities of leukemia such as anemia, thrombocytopenia, hyperviscosity, and

immunosuppression. These can manifest as retinal or vitreous hemorrhage, infections, and as vascular occlusions. In some patients the ophthalmic involvement might be asymptomatic(8).

In multiple myeloma, the ophthalmic manifestations may be the first manifestations of the disease or occur as one of the extramedullary manifestations of the disease or as the first sign of insufficient chemotherapy. These include proptosis, diplopia, lid ecchymosis, xanthomatosis, conjunctival and corneal crystalline and non-crystalline deposits, scleritis, episcleritis, secondary glaucoma, ciliary body cysts, ciliochoroidal effusion, uveal plasmacytoma, hyperviscosity retinopathy, retinal vasculitis, detachment of sensory retina and retinal pigment epithelium, and neuro-ophthalmic manifestations.(9)

In lymphoma, ophthalmic involvement is relatively rare. It can be a result of a primary intraocular lymphoma or an intraocular manifestation of systemic lymphoma. Most of the ocular manifestations have a masquerading findings like allergic or infectious conjunctivitis, uveitis, multiple evanescent white dot syndrome, acute retinal necrosis or herpetic retinitis. Therefore, correct diagnosis depends on a high index of suspicion and frequently requires radiologic and cytologic investigation. Recognition of its modes of presentation facilitates early diagnosis and treatment that may improve prognosis.(10)

Statement of problem

Ophthalmologic manifestations of hematologic malignancies can be an initial presentation of the primary disease or a sign of relapse and can affect different parts of the eye and orbit. Intraocular leukemic involvement has been linked with CNS disease in 50% of cases, and the incidence is higher with posterior segment involvement.(11) Most patients with ophthalmic manifestations might present with bone marrow relapse or central nervous system leukemia. The prognosis was related to risk factors such as central nervous system leukemia or bone marrow relapse in most cases.(12) Orbital and ocular lesions carry a poor prognosis.(13) Therefore, recognizing ocular signs is crucial in the diagnosis and treatment, which may aid in saving patients from this life-threatening disease.(7)

The hematology unit of Tikur Anbessa Hospital is the largest hematologic center in Ethiopia and has a total of 44 beds for inpatient care and around 1,800 patients are seen in the outpatient clinics monthly. However, only very few cases are referred for ophthalmic evaluation.

Significance of the study

With the current trend of increased incidence of malignancies in general and particularly hematologic malignancies ranking the 4th most common malignancy in our region, greater attention should be given to these patients. Despite these striking incidences and increased ocular involvements in such patients, ophthalmic screening is seldom done. By conducting this research, the patterns of ocular manifestations in HM will be evident and will guide which patients will be prioritized for ophthalmic screening. In Ethiopia there is no much significant information regarding this condition. Therefore, it is considered to be important to fill the gaps in knowledge which might give good baseline information for future studies.

Objectives

General Objectives

To determine the pattern of ocular manifestations in patients diagnosed with hematologic malignancies at tertiary hospital

Specific Objectives

To determine which HM patients are commonly having the ocular manifestations

To determine the common ocular manifestations of hematologic malignancies

To determine any associated factors with the development of ocular signs and symptoms

Methods

Study Area

The study was conducted at the Hematology clinics of Tikur Anbessa Specialized Hospital. TASH, a tertiary hospital found in the capital city of Ethiopia, is the main teaching hospital for both clinical and preclinical training of most disciplines. It is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation. Its hematology clinic is one of the busiest clinics where around 1500 patients are seen monthly.

Ophthalmic screening setup was arranged in hematology clinic of TASH. The hematology clinic of TASH has 4 OPD visit days and 1 procedure day.

Study Period

The study was conducted from June 1, 2023 to September 30, 2023

Study Design

A cross-sectional study was conducted to determine the Pattern of ocular manifestations in patients diagnosed to have hematologic malignancies.

Study Population

All patients with a confirmed diagnosis of any form of hematologic malignancies, excluding those with study's exclusion criteria, were enrolled in the study.

Inclusion And Exclusion Criteria

INCLUSION CRITERIA

All patients with a confirmed diagnosis of hematologic malignancies.

EXCLUSION CRITERIA

Patients diagnosed to have:

DM, Hypertension, HIV/AIDS and known systemic vasculitis like SLE GCA, PAN

Data Collection

The principal investigator was at TASH for 2 days per week to screen all patients seen and confirmed to have HM from the hematology clinic. After getting informed verbal consent, subject's relevant demographic data (age, sex, address) were entered to pre- designed questionnaire.

A short history including presenting symptom, duration of illness and previous history of treatment was obtained from the participant. Type of diagnosis was obtained from the medical record of the patient.

The presenting vision on both eyes was measured using Snellen's E visual acuity (VA) chart at 6 meters in all cooperative patients. WHO visual acuity classification was used to grade the VA. Intra ocular pressure was measured with tonopen and documented. External eye examination was done with a torch light. Pupils were examined for reactivity and rAPD. Anterior segment evaluation was done with slit lamp biomicroscope.

Posterior segment evaluation was done after dilation of both eyes with the application of tropicamide and tetracaine with slit lamp biomicroscope using Volk 90D lens. B scan ultrasound was done when there is media opacity precluding posterior segment visualization.

Data Analysis

The collected data was cleaned, checked for completeness, compiled and analyzed using SPSS version 26. Standard descriptive methods (means/percentage and standard Deviations) were used to report results. The result was presented in tables, figures and statements. Significance for association between dependent and independent variables was carried out using chi-square test where necessary and difference will be considered significant at $p < 0.05$.

Quality Control

Pretest was conducted one week prior to actual data collection by investigators on 20 patients and checked for consistency and accuracy. Ambiguous questions in the questionnaire were corrected for final data collection. The outcome of the pretest was discussed with senior consultant and then the corrected questionnaires was used for final data collection. At the end of each day, all of the collected data was reviewed and checked for completeness and entered into a prepared data analysis software using SPSS Version 26 by the principal investigator.

Operational Definitions

Hematologic malignancies- cancer that begin in the blood forming tissue which have been confirmed by bone marrow biopsy or peripheral morphology or clinically diagnosed by a hematologist.

Cataract – lenticular opacity resulting in visual reduction <=6/18

Mild visual impairment - visual acuity worse than 6/12 to 6/18

Moderate visual impairment – visual acuity worse than 6/18 to 6/60

Severe visual impairment visual acuity worse than 6/60 to 3/60

Ethical considerations

An informed consent was obtained from each respondent to participate in the study. Detail explanation about objectives, purposes and benefit of the study was given to the respondents. Confidentiality was assured before conducting data collection.

Result

Demographic and hematologic characteristic of the study participants

In this study, 80 participants having a hematologic malignancy were involved. Thirty-nine percent of the study participants were in the age group of 18-40 with mean and SD of 48.7±18.5 years respectively and the age ranges 18-90 years. Fifty-six percent of the study participants were male and 62.5% were from Addis Ababa. Fifty-one percent of the participants had 1-5 years of duration of illness from hematologic disease. More than 86% of the study participants used medical treatment for hematologic disease and from those 55.1% of them used for 1-5 years duration as shown in Table 1. Below.

Table 1. The demographic and hematologic characteristics of study participants having medical follow up in hematologic units Tikur Anbessa Specialized hospital, 2023.

Variable	Frequency	Percent
Age of the study participants		
18-40	31	38.8
41-60	27	33.8
>60	22	27.5
Sex of the study participants		
Male	45	56.3
Female	35	43.8
Residence		
Addis Ababa	50	62.5
Out of Addis Ababa	30	37.5
Duration of illness in years		
<1	22	27.5
1-5	41	51.2
>5	17	21.3
Duration of hematologic disease diagnosis		
<1	24	30.0
1-5	40	50.0
>5	16	20.0
Ever used medical treatment for hematologic malignancy		
Yes	69	86.3
No	11	13.7
Duration of treatment of malignancy in years (n=69)		
<1	18	26.1
1-5	38	55.1
>5	13	18.8

The characteristics of hematologic malignancy

Concerning the type of diagnosis of the study participants, 30% (n=24) of the participants had chronic myeloid leukemia followed by multiple myeloma (16.25%), polycythemia vera (13.75%), acute lymphoblastic leukemia (12.5% and chronic lymphocytic leukemia as shown the figure below.

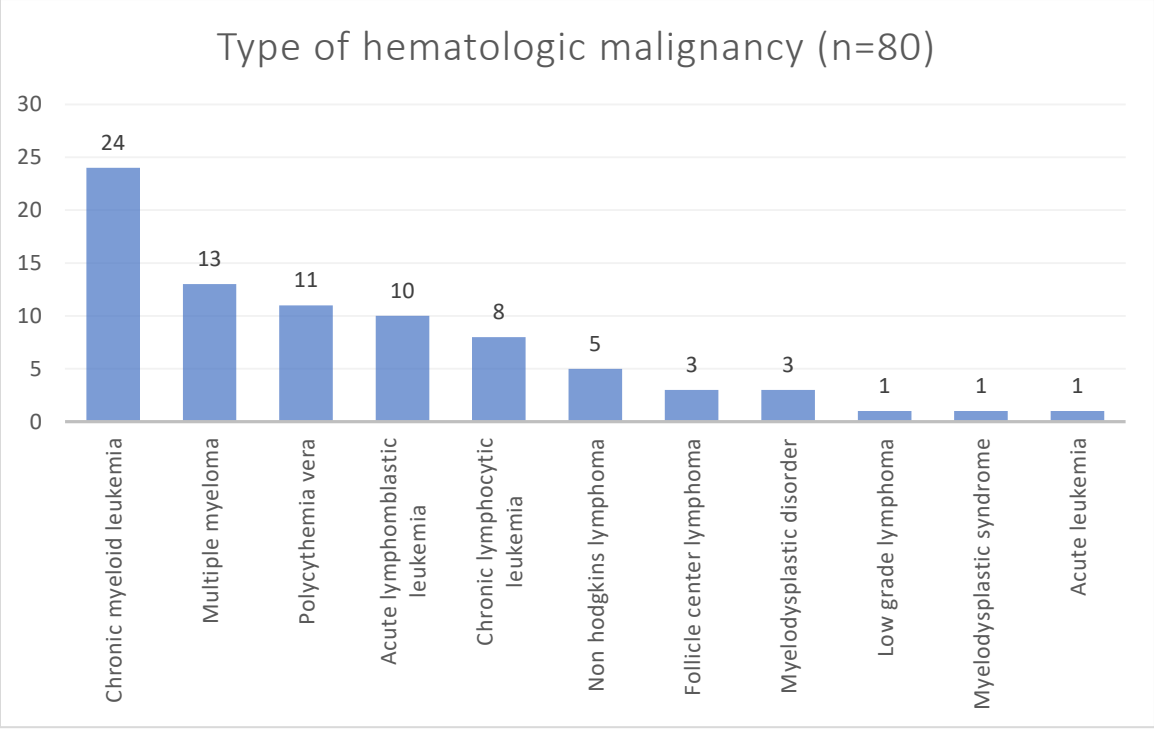

Figure 1. Types of hematologic malignancy , TASH, 2023

Ocular compliant characteristics of the study participants

In this study half of (n=40) of the study participants had an ocular compliant and from those compliant visual reduction accounts 65% (n=26) followed by tearing (15%), redness (10%) and floater, itching, discharge and foreign body sensation. Majority of the ocular complaints were in both eyes and 22.5% were in the right eye and 15% were in the left eye. More than half (52.5%) of the ocular complaints had 1-5 years duration and 20% of those having ocular complaint had a history of ocular treatment.

Table 2. Ocular complaints of the study participants with HM, TASH, 2023.

Variable	Frequency	Percent
Presence of ocular compliant		
Yes	40	50.0
No	40	50.0
Types of ocular compliant (n=40)		
Visual reduction	26	65.0
Floater	1	2.5
Redness	4	10.0
Tearing	6	15.0
Itching	1	2.5
Discharge	1	2.5
Foreign body sensation	1	2.5
Types of compliant eye (n=40)		
Unilateral	15	37.5
Bilateral	25	62.5
Duration of presenting ocular compliant		
<1	11	27.5
1-5	21	52.5
>5	8	20.0
History of ocular treatment (n=40)		
Yes	8	20
No	32	80

Study participant's ocular findings by physical examination

The study revealed that 32.5% had normal visual acuity, and 3.8% had severe visual impairment. The mean, minimum and maximum right eye IOP were 17.5, 10 and 26mmHg respectively and the mean, minimum and maximum IOP of left eye were 16.4, 11 and 28mmHg respectively.

Table 3. Study participants' ocular finding by physical examination, TASH, 2023

Variable	Frequency	Percent
Visual Acuity		
Normal	26	32.5%
severe visual impairment	3	3.8%
Right eye IOP		
Mean	17.53	
Std. Deviation	3.21	
Minimum	10	
Maximum	26	
Left eye IOP		
Mean	16.4	
Std. Deviation	3.63	
Minimum	11	
Maximum	28	

In this study 24% (n=19) of the study participants with hematologic malignancies had ocular manifestation. From those having ocular manifestation 68.4% had on both eyes and 15.8% had right eye only and 15.8% had left eye only affected.

The highest proportion of ocular manifestation was cataract which affected 16.5% (n=13) of the participants. From those having cataract, 6 of the participants had bilateral eyes involved, and 7 had unilateral. The second frequent ocular manifestation seen in HM patients was Vitreous Hemorrhage and retinal hemorrhages followed by cornea depositions.

Table 4. Patterns of ocular manifestation of the patients with hematologic malignancies, TASH, 2023.

Pattern of ocular manifestation (n=80)	frequency	Percent
(Eyelids) Lid ecchymosis nodules	1	1.3
Salmon's Patch	1	1.3
Conjunctival Depositions	1	1.3
Cornea (Deposition)	2	2.5
Anterior Chamber Reaction	2	2.5
Cataract	13	16.3
Vitreous Hemorrhage	5	6.3
Retinal hemorrhages	**5**	**6.3**
Superficial Retinal Hemorrhages	1	1.3
Deep Retinal Hemorrhages	2	2.5
Pre-Retinal Hemorrhages	1	1.3
Roth Spots	1	1.3

8.5 The relation between types of hematologic malignancy and ocular manifestations

This study revealed that majority of the ocular manifestation (21.1%) occurred in those with multiple myeloma followed by chronic myeloid leukemia (15.3%), polycythemia vera (15.8%), and acute lymphoblastic leukemia (10.5%) as shown in the table below.

Table 5. The relation between types of hematologic malignancy and ocular manifestations, TASH,2023

Type Of Diagnosis	Ocular Manifestation		Total
	Yes(%)	No(%)	
Acute Lymphoblastic Leukemia	2(10.5)	8(13.1)	10(12.5)
Chronic Lymphocytic Leukemia	1(5.3)	7(11.5)	8(10)
Chronic Myeloid Leukemia	3(15.8)	21(34.4)	24(30)
Low Grade Lymphoma	1(5.3)	0	1(1.3)
Multiple Myeloma	4(21.1)	9(14.8)	13(16.3)
Non-Hodgkin's Lymphoma	2(10.5)	3(4.9)	5(6.3)
Polycythemia Vera	3(15.8)	8(13.1)	11(13.8)
Follicle Center Lymphoma	0	3(4.9)	3(3.8)
Myelodysplastic Disorder	2(10.5)	2(3.3)	4(5.1)
Acute Leukemia	1(5.3)	0	1(1.3)

The determinants of associated factors with the development of ocular signs

Age, residence, and treatment history for hematologic malignancy showed an association with ocular manifestation on bivariable logistic regression. The multivariable logistic regression revealed that participant whose age >60 years had 3.2 folds increase in occurrence of ocular manifestation compared to age 18-40 years (AOR=3.2, 95%CI=1.36, 5.97) and participants who were from out of Addis Ababa were at 2.7folds increased risk of ocular manifestation compared to those from Addis Ababa (AOR=2.7, 95%CI=1.82, 8.96).

Table 6, The bivariable and multivariable logistic regression for association between independent and dependent variable in hematologic malignancy patient, TASH,2023

Variable	Ocular Manifestation		p-value	COR with 95%CI	p-value	AOR with 95%CI
	Yes	No				
Age of the study participants						
18-40	6	25	1		1	
41-60	3	24	0.392	0.52(0.12, 2.32)	0.475	0.56(0.11, 2.75)
>60	10	12	0.046	3.5(1.02, 11.81)	0.010	**3.2(1.36, 5.97)**
Sex						
Male	13	32	0.225	1.9(0.66, 5.84)	0.598	1.5(0.36, 5.98)
Female	6	29	1		1	
Residence						
Addis Ababa	9	41	1		1	
Out of Addis Ababa	10	20	0.012	2.3(1.79, 6.49)	0.030	**2.7(1.82, 8.96)**
Duration of illness						
<1	5	17	1		1	
1-5	8	33	0.764	0.82(0.23, 2.91)	0.751	1.3(0.29, 5.58)
>5	6	11	0.390	1.9(0.45, 7.58)	0.122	3.9(0.69, 22.72)
Treatment history of hematology						
Yes	15	54	1		1	
No	4	7	0.029	2.1(1.53, 7.97)	0.346	2.1(0.45, 9.52)

Discussion

The finding of the study revealed that the frequency of hematologic malignancies among those screened for ocular manifestation were chronic myeloid leukemia 30% (n=24 followed by multiple myoma (16.25%), polycythemia vera (13.75%), acute lymphoblastic leukemia (12.5%) and chronic lymphocytic leukemia. This finding was supported by the study done in India by Savya Soman et al (5).

Majority of the ocular manifestation (21.1%) were found in multiple myeloma followed by chronic myeloid leukemia (15.3%), polycythemia vera (15.8%), and then in acute lymphocytic leukemia (10.5%). The pattern of this finding was different from another study done at a tertiary care hospital of Pakistan (16) where they found that ocular involvement was significantly more common in newly diagnosed patients. This difference was may be due to difference in number of the study participants.

In this study 24% (n=19) of the study participants with hematologic malignancy patients had ocular manifestations. This finding was lower than the study done by Hafeez MU et al, at a tertiary hospital in Pakistan (16). The difference may be due to difference in the study population. Their study assessed ocular manifestation in leukemic patients while the current study assessed ocular manifestation in all hematologic malignancy patients.

In this study ocular manifestation was commonly seen in multiple myeloma (21.1%) and chronic myeloid leukemia (15.8%). This finding was discordant with the study done in Pakistan in 2019 by Mohammad Uzair Hafeez MU et al (16). This may be because the HM involved is only leukemia in literature were acute lymphoblastic leukemia accounted for the maximum portion with ocular signs. Whereas in a study done in Nigeria by Eze BI, Ibegbulam GO, and Ocheni S in 2010, leukemic ophthalmopathy was more prevalent in chronic leukemia than acute ones which is similar to our study. This might be due to sharing similar risk factors like poor socioeconomic status and poor access to health facility.

Concerning the pattern of ocular manifestation, cataract accounted for 16.5% (n=13), followed by retinal and vitreous hemorrhage which accounted for 12.6 % combined. The result was unlike other studies where posterior segment findings were more common. This may be

due to the study population involving more of older individuals who will be having cataract either way.

The multivariate logistic regression revealed that participant with age >60 years had 3.2 folds increase its ocular manifestation compared to age 18-40 years (AOR=3.2, 95%CI=1.36, 5.97). This may be due to as age increase the ocular manifestations also prevail in addition to the cofactor impact of hematologic malignancy.

Participants who were from out of Addis Ababa were 2.7 folds increase its ocular manifestation compared to those of from Addis Ababa (AOR=2.7, 95%CI=1.82, 8.96). This may be due to difference in accessibility of health facility where a delay or absence in facility may attribute to the development of the ocular manifestation.

Strength and Limitations

The study was conducted in a short period of time and has limited it to get enough samples to collect. Having smaller sample size has limited if from different statistical analysis being executed. The study was a cross-sectional study which might not explain why certain ocular manifestations occur and why others didn't. A longitudinal or case control studies, if done, might answer this question.

Conclusion and recommendations

In this study ocular manifestation of hematologic malignancy was commonly seen in patients with multiple myeloma (21.1%), followed by chronic myeloid leukemia (15.3%), polycythemia vera (15.8%) and acute lymphoblastic leukemia (10.5%). The finding also showed that 24% of the participants had ocular manifestation. Among those manifestations cataract accounted 16.5% (n=13), followed by Vitreous Hemorrhage (6.3%) and Retinal hemorrhage (6.3%) then corneal deposition (2.5 %). The determinate factor of ocular manifestation identified was age of >60 years (AOR=3.2, 95%CI=1.36, 5.97) and residence out of Addis Ababa (AOR=2.7, 95%CI=1.82, 8.96).

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Annex

Consent Form for participants

Date_____

Hello, my name is Dr. Inas Basha. I am working as a data collector for the study being conducted in this hospital. I kindly request you to give me your attention to explain about the study.

Study title – Pattern of ocular Manifestations in Patients with Hematologic Malignancies in tertiary hospital, Addis Ababa, Ethiopia

Importance and Purpose of The Study: The study is aimed at providing baseline information on the pattern of ocular manifestations of hematologic malignancies in the hospital.

Procedure and Duration: I will be interviewing you using questionnaire. I will not take more than 30 minutes of your time.

Risks and Benefits: The risk of being participated in this study is negligible, but only taking a few minutes from your time. There would not be any direct payment for participating in this study. However, the findings from this research may reveal important information for the health professionals and researchers working in ophthalmology and hematology.

Confidentiality: The data you will provide us will be confidential. There will be no information that will identify you. The findings of the study will be general for the study population and will not reflect anything particular of individual person. No reference will be made in oral or written reports that could link participants to the research. You have full right to refuse to take part or to interrupt the interview at any time.

Are you willing to participate in the study?

1- Yes 2 - No

If yes, continue to the next page

If no, skip to the next participant

Questionnaire for participants

1. Identification
    a. Study no…….
    b. Age (in years) ……
    c. Sex…….1. M 2. F
    d. Place of residence(city)…… ……
2. History
    a. Duration of illness……
    b. Time of diagnosis
    c. Type of diagnosis
        i. Acute lymphoblastic leukemia/ALL
        ii. Acute myeloid leukemia / AML
        iii. Chronic lymphocytic leukemia/CLL
        iv. Chronic myeloid leukemia /CML
        v. High grade Lymphoma
        vi. Low grade lymphoma
        vii. Multiple myeloma
        viii. Other …specify……
    d. History of treatment ……. 1. Yes 2. No
        i. If yes, mention…….
    e. If yes to previous question, Duration of treatment …….
    f. Any ocular complaint…….1. Yes 2.No
        i. If yes, mention……
            - Visual reduction
            - Floaters
            - Scotomas
            - Swelling
            - Protrusion of eyes
            - Pain
            - Redness
            - Double vision
            - Other, mention
        ii. If yes, which eye……1. Right 2. Left 3. Both
        iii. If yes, duration……..
        iv. If yes, any history of ocular treatment 1. Yes 2. No
3. Physical examination
    a. Visual Acuity RE LE
    b. Intraocular pressure RE LE

Physical examination	Right		Left	
	1. Yes	2. No	1. Yes	2. No
Relative afferent pupillary defect				
Anterior segment structures involvement				
(Eyelids) Lid ecchymosis Nodules				
(Conjunctiva, sclera) Sub conjunctival hemorrhage Salmon's patch Depositions Chemosis Episcleritis Scleritis				
(Cornea) Depositions				
(Anterior Chamber) Reaction				
(Iris) Cysts				
(Lens) cataract				
(Dilated fundus examination) Vitreous hemorrhage Venous dilation and tortuosity microaneurysms Superficial and deep retinal hemorrhages Pre retinal hemorrhage Cotton wool spots Roth spots Retinal vein occlusion Retinal detachment Choroidal effusion Disc edema				
(Investigation)Ultrasonography Vitreous hemorrrhage Choroidal effusion Retinal detachment Optic nerve swelling				