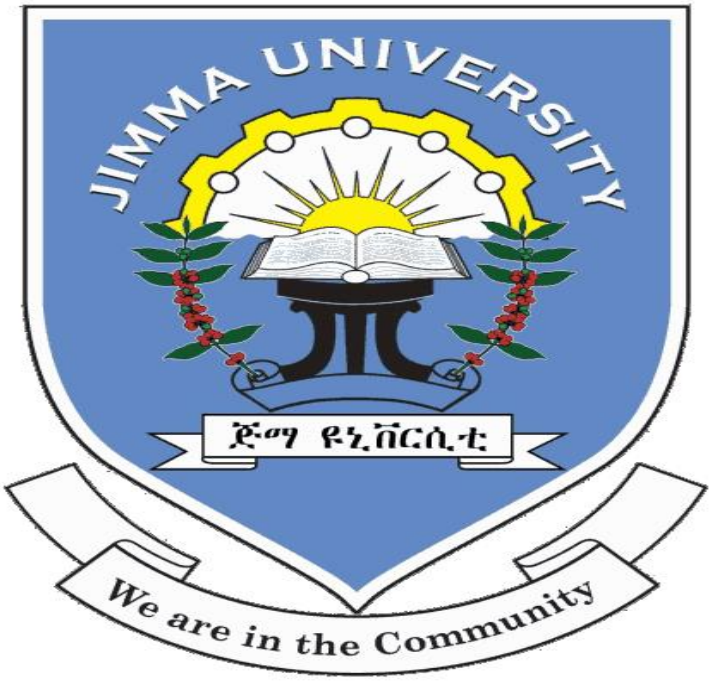
CLINICAL PROFILE AND ASSOCIATED RISK FACTORS OF RETINAL VASCULAR OCCLUSION IN PATIENTS ATTENDING RETINA CLINIC, DEPARTMENT OF OPHTHALMOLOGY OF JUMC, SOUTHWEST ETHIOPIA.



By Victoria D. Gelmessa (MD, Year Four Ophthalmology Resident)

A RESEARCH PROPOSAL FOR THE PREPARATION OF THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY, INSTITUTE OF HEALTH SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE SPECIALIZATION DEGREE IN OPHTHALMOLOGY SPECIALITY.

JIMMA UNIVERSIRTY INSTITUTE OF HEALTH, FACULTY OF MEDICAL SCIENCE, DEPARTMENT OF OPHTHALMOLOGY.

CLINICAL PROFILE AND ASSOCIATED RISK FACTORS OF RETINAL VASCULAR OCCLUSION IN PATIENTS ATTENDING RETINA CLINIC, DEPARTEMENT OF OPHTHALMOLOGY OF JUMC FROM 2021-2022.

By VICTORIA D. GELMESSA (MD)

ADVISORS:

1) Dr Sisay Bekele(vitreoretinal surgeon, associate professor of ophthalmology)
2) Dr Sagni Jelkeba(MD, Assistant Prof. of Ophthalmology)
3) Mr Jemmal Mohammed(B.S.C, M.P.H)

ABSTRACT

Background: Acute retinal vascular occlusions are common causes of visual loss and are mostly associated with advanced age, cardiovascular risk factors like hypertension, diabetes mellitus, and dyslipidemia. Globally, millions of individuals are affected with various degrees of visual outcomes. These cardiovascular risk factors are dramatically increasing in our country(1). However, we don't know whether the burden of retinal vascular occlusion parallels these risk factors.

Objective: The study aims to determine the clinical profile of retinal vascular occlusion (both arterial and venous) and associated risk factors.

Methodology: A facility based a case control study was carried out from JAN 2021 to DEC 2022 among patients visiting retina clinic of JUMC. A total of 78 patient with retinal vascular occlusion was identified. 156 control patient was identified by age sex matching with 1:2 ratio. Data was collected using a pretested structured questionnaire. Bivariable logistic regression was done, and variables with p-value less than 0.25 in the bivariate analysis was entered to multivariable logistic regression model to identify independent predictors and the magnitude of association between the different variables in relation to the outcome variable was measured by adjusted odds ratio (AOR) with 95% confidence interval (CI). A P-value less than 0.05 at 95% CI as cut of point was used to declare the observed association is statistically significant.

Results: Retinal vascular occlusion constitute 4.99% of vitreo-retinal cases. Majority of retinal vascular occlusions identified were retinal venous occlusion 76 (97.4%). CRVO constitute majority of retinal venous occlusion 41 (53.9%), followed by BRVO 32(42.1%) and HRVO 3(4%). Hypertension was the commonest risk factor seen in 51(65.4%) patients, AOR (39.0), P value <0.001, CI 15.77-96.81, followed by glaucoma 22(28.2%), AOR (2.66), CI (1.132-6.262). Thirty five (44.9%) had complication at the time of presentation. The commonest complication encountered was macular edema 21(60%) followed by neovascularization 9(25.7%). Fifty eight (74.36%) were males and mean age was 60±14 years. Forty nine (62.8%) were legally blind. mean Duration of presentation was 50.84±35 weeks.

Conclusion: Majority of patients affected by retinal vascular occlusion were males, RVO being the most predominant type. Hypertension and glaucoma are the identified risk factors with clinically significant association. Most patients had delayed presentation with complications and irreversible blindness.

Key words: retinal vascular occlusion, pattern, associated factors, Jimma, Ethiopia.

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LISTS OF ABBREVATION

BRAO ---------- Branch retinal arterial occlusion

BRVO ---------- Branch retinal venous occlusion

CRVO ---------- Central retinal venous occlusion

CRAO ---------- Central retinal arterial occlusion

HRVO ---------- Hemispheric retinal vein occlusion

IT ---------- Inferotemporal

IN ---------- Inferonasal

ICA ---------- Internal carotid artery

OAO ---------- Ophthalmic artery occlusion

RAO ---------- Retinal arterial occlusion

RAVO ---------- Retinal arterial and venous occlusion

RVO ----------Retinal venous occlusion

ST ---------- Superotemporal

SN ---------- Superonasal

TMVL ----------Transient monocular vision loss

VA ----------Visual acuity

VEGF ----------Vascular endothelial growth factor

CHAPTER 1: INTRODUCTION

1.1 Background

Retinal vascular occlusion is an obstruction of normal retinal vascular system. Acute retinal vascular occlusions are common causes of visual impairment. While both retinal artery occlusions (RAOs) and retinal vein occlusions (RVOs) are associated with increased age and cardiovascular risk factors, their pathophysiology, systemic implications, and management differ significantly(2).

Acute retinal vascular occlusions are common causes of visual loss(2). Retinal vein occlusion (RVO) is the second most common vascular disorder, and it is also much more common than retinal arterial occlusions (RAOs) and have a better prognosis(3,4). While both occur more commonly in the older population and are associated with cardiovascular risk factors, RVOs do not usually require specific systemic work-up,(2,3) whereas acute RAOs, including vascular transient monocular vision loss (TMVL), branch retinal arterial occlusion (BRAO), central retinal arterial occlusion (CRAO) and ophthalmic arterial occlusion (OAO), are associated with a higher risk of stroke and cardiac events that must be addressed acutely(5,6). Although acute management of RAOs is well codified and involves neurologists with stroke expertise, there is no proven ocular treatment for acute RAO. In contrast, evaluation and treatment of central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO) “belong” to ophthalmologists, with numerous studies addressing treatment of RVOs for which guidelines are available(2).

Acute CRAO or BRAO with CRVO is rare and may indicate a systemic disease such as vasculitis, hypercoagulable state or malignancy(7).

RAO is acute arterial retinal ischemia requires immediate diagnosis and treatment(5). The blood supply to the inner layers of the retina is derived entirely from the central retinal artery, unless a cilioretinal artery is present (20%–25% of eyes)(8). Retinal ischemia results from disease processes that affect the vessels anywhere from the common carotid artery to the intraretinal arterioles. The signs and symptoms of arterial obstruction depend on the vessel involved: occlusion of a peripheral arteriole may be asymptomatic, whereas an ophthalmic artery occlusion can cause total blindness(8). Estimated incidence of CRAO is 1-2 PER 100,000, is higher in men

than in women(9,10). It increases with age with incidence as high as 10 per 100,000 in older adults(11). Ophthalmic artery occlusions are rare and BRAO accounts one third of acute RAOs(10).

Most of RAO patients are diagnosed with major vascular risk factors like hypertension, diabetes mellitus, dyslipidemia, and acute coronary syndrome at the time of presentation(2). Severe atheromatous ICA stenosis is found in up to 40 % (12,13)which may need urgent surgery per stroke guidelines. The leading cause of death in patients with retinal arterial obstruction is cardiovascular disease with an elevated risk of myocardial infarction within the first 7 days following onset of the obstruction(2).

Acute RAO commonly leads to permanent retinal ischemia and irreversible cell death within a few hours(2). Emboli from the ICA, aortic arch or heart are the main causes of RAO(2). Non-embolic RAO may result from systemic vasculitis such as giant cell arteritis, as well as hematologic, immune-mediated and infectious disorders (2,7).

Sudden, complete, and painless loss of vision in one eye is characteristic of CRAO(8). With time, the central retinal artery reopens or recanalizes and the retinal edema clears; however, the effect on visual acuity is usually permanent because the inner retina has been infarcted. Vaso-occlusive vision loss to the level of no light perception is usually caused by choroidal vascular insufficiency from partial or complete ophthalmic artery occlusion or occlusions of the ciliary arteries in conjunction with occlusion of the central retinal artery. CRAO is most often caused by embolization or atherosclerosis related thrombosis occurring at the level of the lamina cribrosa. Less common causes are hemorrhage under an atherosclerotic plaque, thrombosis, trauma, spasm, and a dissecting aneurysm within the central retinal artery(8).

Acute BRAO may be subtle and unapparent on initial ophthalmoscopic examination, within hours to days, it can lead to edematous opacification caused by infarction of the inner retina in the distribution of the affected vessel. In time, the occluded vessel recanalizes, perfusion returns, and the edema resolves; however, a permanent visual field defect remains(8).

RVO is the second most common retinal vascular disorder following diabetic retinopathy and is an important cause of visual loss and visual handicap(14,15). Delay in detection and treatment can result in irreversible visual impairment and blindness. According to the site of occlusion, RVO can be broadly classified as branch RVO (BRVO) and central RVO (CRVO)(16). BRVO

typically occurs at an arteriovenous intersection, whereas CRVO at or near the lamina cribrosa of the optic nerve(8,15,17). Taken individually, BRVO is more prevalent, but less visually damaging, than CRVO(18,19,20). In 2015, the global prevalence of any RVO, BRVO and CRVO in people aged 30-89 years was 0.77%, 0.64% and 0.13%, translating to a total of 28.06 million, 23.38 million and 4.67 million affected individuals respectively(16).

Central retinal vein occlusion is further divided into two categories: non-ischemic (perfused) and ischemic (nonperfused) (21,22). Non-ischemic CRVO is the most common, accounting for about 70% of cases. Best-corrected visual acuity (BCVA) is often better than 20/200(22).

The risk of BRVO and CRVO increases with age(2,8). Hypertension and arteriolar narrowing or nicking are particularly important risk factors for BRVO, but also increase CRVO risk. Diabetes, glaucoma and increased cup-to-disc ratio are strong risk factors for CRVO, but may also increase BRVO risk(2).

Glaucoma, in both open- and narrow-angle forms, is a major risk factor for RVO(8). A history of glaucoma was found to increase a patient's risk of CRVO by a factor of 5.3, and of BRVO by a factor of 2.5(23).

Improvement or spontaneous resolution can occur in patients with RVO(8). Improvement is usually associated with the development of adequate collateral blood flow. Chronic, untreated venous occlusive disease commonly leads to development of retinal microvascular changes characterized by microaneurysms, telangiectasias, and macular edema(8).

Anti– vascular endothelial growth factor (VEGF) drugs are mainstay of RVO treatment. Best visual acuity outcomes are achieved by administering anti- VEGF treatment immediately upon diagnosis of RVO- related macular edema. Anti- VEGF treatment also suppresses neovascular complications of RVO. Intraocular steroid treatments and macular or scatter panretinal photocoagulation are also employed to manage vision loss from, and complications of, RVO(8).

1.2. Statement of the Problem

Retinal vascular occlusions are common cause of visual impairment. RVO is the second most common retinal vascular disorder. BRVO is more prevalent, but less visually damaging, than CRVO. Although people with RVO are generally asymptotic and painless at the early stages, variable (or even severe) vision loss could be resulted in by complications of RVO, especially that of CRVO. Common complications of BRVO and CRVO include macular edema, macular ischemia, which are persistent and difficult to treat(8). In 2015, the global prevalence of any RVO, BRVO and CRVO in people aged 30-89 years was 0.77%, 0.64% and 0.13%, translating to a total of 28.06 million, 23.38 million and 4.67 million affected individuals respectively(16). Previous studies have documented advanced age, hypertension and other vascular factors as risk factors for RVO but didn't differ significantly between sexes. With global ageing trend and the expanding burden of cardiovascular diseases, it is expected that RVO might place an increasing burden on society.

Central retinal artery occlusion (CRAO), the ocular analog of a cerebral stroke, is an ophthalmic emergency(24). The visual prognosis for overall spontaneous visual recovery in CRAO is low as it has been found that only 17.7% of patients obtain functional visual recovery without any treatment(24). Furthermore, CRAO indicates end-organ ischemia, often due to underlying atherosclerosis. These underlying atherosclerotic risk factors also increase the risk of future cerebral stroke and ischemic heart disease in the individual. There is currently no guideline-endorsed treatment for CRAO(24,25).

In Ethiopia, these cardiovascular risk factors are dramatically increasing (1) and we don’t know whether the burden of retinal vascular occlusion parallels these risk factors. However, as far as our web site database search was concerned, there is paucity on studies about retinal vascular occlusion in Ethiopia. Therefore this study may shade a light on pattern and associated risk factors of retinal vascular occlusion, at least in hospital set up, and will lay ground for further studies.

1.3. Significance of the Study

This study, which aims to assess clinical profile and factors associated with retinal vascular occlusion among patients attending Jimma university medical center, department of ophthalmology, retina clinic, and to compare the findings with other edited national and international data, will be significant to reveal possible recommendations. Further, since we don't know the burden, clinical pattern and risk factors of retinal vascular occlusion in our setup, this study is one of its kinds to study about retinal vascular occlusion in our setup. Therefore, this study will tell us slightest of evidence about the burden of the diseases and associated risk factors in our setup. It thus provides as a baseline information for further studies.

Further, the study will help policy makers, health professionals, government and non-government organizations to see the burden of retinal vascular occlusion and help in planning adequate eye screening programs in high risk patients like hypertension and cardiovascular diseases.

CHAPTER 2: LITERATURE REVIEW

Although there are large data of researches done globally about RVO, there is paucity of data in Ethiopian context.

Peige Song et al. conducted a comprehensive review and meta-analysis of the global prevalence and incidence of RVO, which revealed that while the prevalence of branch RVO (BRVO), central RVO (CRVO), and any RVO rose with advanced age, there was no significant difference between the sexes. In individuals between the ages of 30-89, the global prevalence of any RVO, BRVO, and CRVO was 0.77% in 2015. Of these, 0.64% were BRVO and 0.13% were CRVO. The pooled five-year cumulative incidence for any RVO was 1.63%, whereas the ten-year cumulative incidence was 0.86%. The greatest risk factor for any RVO was hypertension, which had a meta- odds ratio (OR) of 2.82 (95% CI = 2.12-3.75) (16). Comparable results were discovered using Pooled Data from Population Studies conducted in Australia, Europe, Asia, and the United States(16).

Several studies conducted in the Caucasian population aged from 40 years and above have shown that the prevalence of branch retinal vein occlusion (BRVO) and central retinal vein occlusion (CRVO) ranges between 0.6% 1.1% and 0.1–0.4%, respectively (26)

The Bhaktapur retina study examined the prevalence, incidence, and risk factors of retinal vein occlusion in an older population in Nepal. One thousand eight hundred sixty, all over the age of sixty were included in this population-based, cross-sectional study. The age distribution was 69.64 ± 7.31 years, with a range of 60 to 95 years. Overall population prevalence for RVO was 2.95%, BRVO 2.74% and CRVO 0.21%. RVO was prevalent in the population overall at 2.95%, BRVO at 2.74%, and CRVO at 0.21%. 51 participants (92.73%) had BRVO, while 4 subjects (7.27%) had CRVO. Unilateral engagement was 85.45% of the entire RVO, whereas bilateral involvement was 14.55%. The risk of RVO increased with ageing and was more among males. . Individuals with diabetes and hypertension, as well as those with hypertension alone, had a higher chance of developing RVO. (27)

In retrospective study about combined CRVAO in 5151 patients seen in 6months in tertiary eye care center in India, seventeen eyes with CRVAO accounted for 0.3% of total vascular occlusion.

The mean age was 48.12 ± 17.5 years and there were 9 females. Nine eyes had CRVO + CRAO; 6 eyes had BRVO + BRAO, and one patient each had CRVO + BRAO and CRAO + BRVO. The most common systemic associations were hypertension and dyslipidemia(28)

In studies done in Nigeria in two cities and two hospital set-ups, the most common risk factors for RVO are hypertension, diabetes and hyperlipidemia. The most common ocular association was glaucoma (27, 28). One of the studies showed retinal vein occlusion is more common than retinal arterial occlusion. One study also showed RVO to be more common in male. Mean age of patients in two studies were 58+-12 years and 62.7 +-10.4years (29).

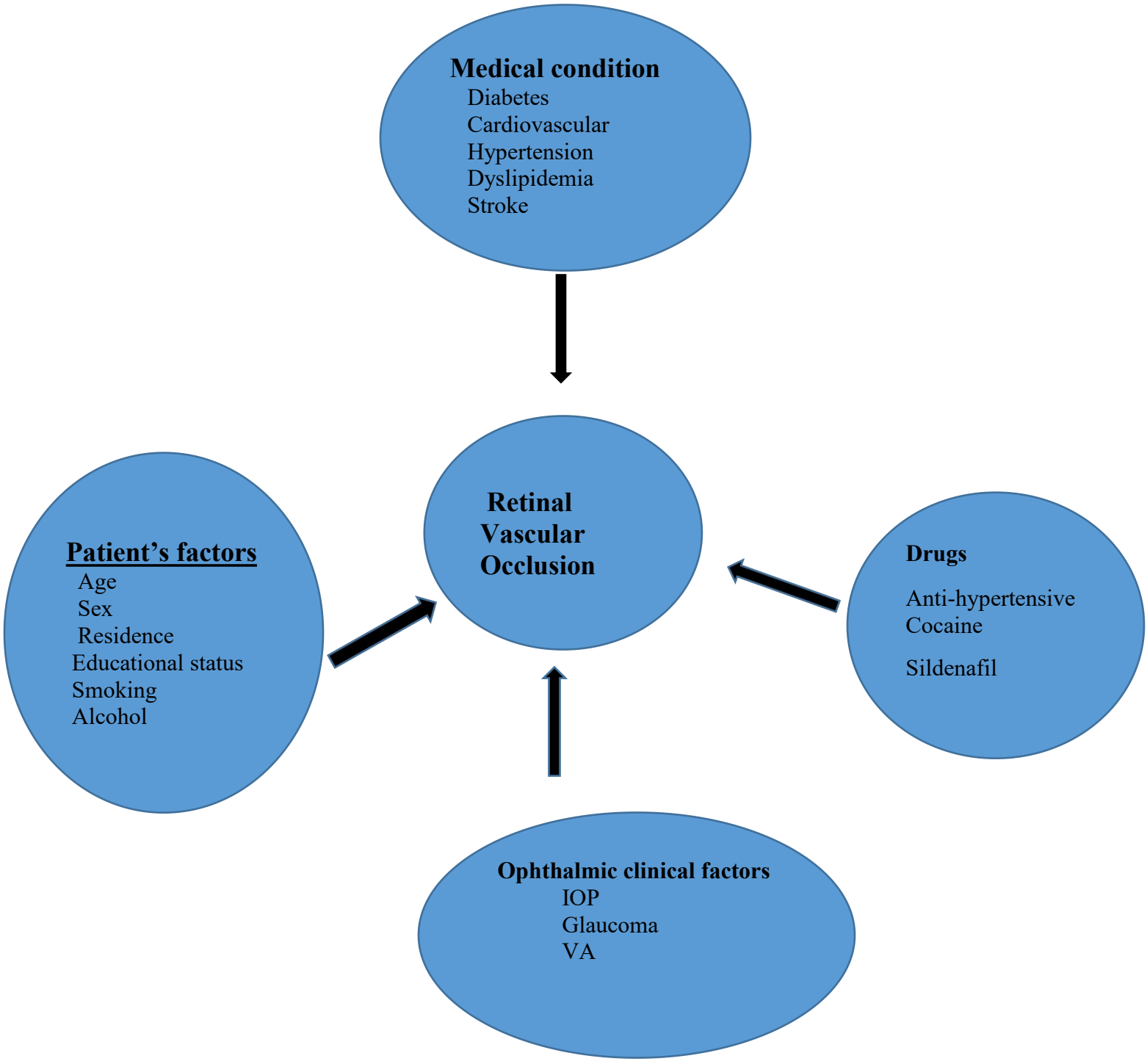
A study done on the Incidence of Central Retinal Artery Occlusion in Olmsted County, Minnesota. Medical records of all patients living in Olmsted County, MN between 1976 and 2005 diagnosed with central retinal artery occlusion cases were identified, the results indicate a yearly incidence of 1.02 per 100,000 for females and 1.67 per 100,000 for males, with a combined incidence of 1.33. The incidence increase with age(10). Similar study done in Korea on nationwide incidence of clinically diagnosed CRAO from 2008-2011 shows the incidence increase with age. Incidence rate in men was 1.47 times than women(11).

In a case control study done in the USA state of Michigan, 87 patients with retinal vein occlusion were chosen randomly from photograph files from 1985 to 1990, and a control group of 85 subjects age 38 and older were selected from the records of two general ophthalmologists in the authors department. Associated risk factors include systemic HTN (OR 3.86, 95% CI =2.08-7.16), Open-angle glaucoma (OR 2.09, 95% CI =1.38-6.05), and male sex (OR 2.61, 95% CI =1.43-4.79). Race, DM, history of coronary artery disease or stroke, and family history of these factors were not significant risk factors in this study(30). Similar study done in USA to assess associated risk factors of central retinal vein occlusion, Consecutive patients with CRVO examined from July 1, 2005 through July 31, 2006 were compared with an historical gender- and age-matched control group of patients with ocular problems other than vascular occlusive disease from the same referral practice. There were 144 patients with CRVO, 87 males and 57 female, mean age was 69.6±13.6 years. CRVO was associated with hypertension ($P < .001$), diabetes mellitus (P .047), glaucoma ($P < .001$), atrial fibrillation (P .036), angiotensin-converting enzyme

inhibitor use (P .022), aspirin use (P < .001), and warfarin use (P .011) by univariate analyses(31).

A cross-sectional study on retinal vein occlusion done in retinal clinic of Gondar University Tertiary Hospital over 6months period. Out of 36 newly diagnose patients with RVOs 38 eyes were examined. This constituted 5 % of viteroreitinal diseases. Twenty four (66%) were males and the mean age was 58 ± 10.87 years. Thirty four (94.4%) patients had unilateral disease. Nineteen (52.78%) had Central retinal vein occlusion (CRVO), 13 (36.11%) had branch retinal vein occlusion (BRVO) and 4 (11.11%) had hemispheric retinal vein occlusion (HRVO). Glaucoma was the commonest risk factor seen in 17 (47.22%) patients followed by systemic hypertension 10 (27.78%) and diabetes mellitus 8 (22%). The commonest complications encountered were macular edema, retinal or optic disc neovascularization and neovascular glaucoma seen in 15 (41.67%), 11 (30.5%) and 4 (11.11%) patients respectively. Over a third of patients 15 (41.67%) presented to our retina clinic after 6 months of onset of the illness and 15 (39.47%) eyes were blind at presentation. (32)

CONCEPTUAL FRAMEWORK



CHAPTER 3: OBJECTIVE OF THE STUDY

3.1. General Objective

To assess the clinical profile and associated risk factors of retinal vascular occlusion among patients visiting retina clinic of ophthalmology department of JUMC from JAN 2021-DEC 2022**.**

3.2. Specific objectives

- To determine types of retinal vascular occlusion among patients visiting retina clinic of JUMC from 2021 to 2022.
- To determine the clinical presentation of retinal vascular occlusion among patients visiting retina clinic of JUMC from 2021 to 2022.
- To identify complications of retinal vascular occlusion at presentation among patients visiting retina clinic of JUMC from 2021 to 2022.
- To identify the risk factors associated with retinal vascular occlusion among patients visiting retina ophthalmology clinic of JUMC from 2021 to 2022.

CHAPTER 4: METHODOLOGY OF THE STUDY

4.1 Study Area

The study was conducted in Jimma University Medical Center OF department of Ophthalmology. Jimma University Medical Centre (JUMC) is one of the oldest public hospitals in the country with a bed capacity of 800. Geographically, it is located in the city of Jimma, which is the administrative center of Jimma zone and it is one of the commercial center for Southwest Ethiopia and located 352 Km southwest of Addis Ababa, capital of Ethiopia. Jimma town has a total population of 207,573 (33)

Currently JUMC is the only teaching and referral hospital in the southwestern part of the country, providing services for approximately 16,000 inpatient, 220,000 outpatient attendants, 12,000 emergency cases and 4,500 deliveries in a year to people coming to the hospital from the catchment population of about 20 million people. The hospital has 1600 staff members and 32 care units.

Jimma university department of ophthalmology, eye clinic is the only tertiary eye center which provides service on eye care for all population of southwest part of the country and it is a teaching center. It has a total of 88 staffs; 3 subspecialists, 10 ophthalmologists, 23 residents from the first to fourth years, 4 optometrists, 2 ophthalmic nurses and 25 general nurses and including other staffs. With a bed capacity of 46, giving services for inpatients and 3 general outpatient rooms for new and follow up patients with general ophthalmology cases, one refraction clinic and five subspecialty clinics. It also gives surgical outreach services to patients in the catchment area who could not come to the hospital especially those with cataract and trachomatous trichiasis.

Retina clinic is one of the subspecialty clinics in JUMC. It has a minimum of 5 staff's one consultant vitreoretinal surgeon 1 general ophthalmologist and 2 ophthalmology residents and one nurse.

4.2 Study design and study period

A case- control study was conducted among patients attending retina clinic, department of ophthalmology of JUMC from JAN 2021- DEC 2022.

Data collection time was from 14, AUG to 12 SEP 2023.

4.3 Population

4.3.1 Source population

The source population for this study was all patients attending retina clinic, department of ophthalmology of JUMC.

4.3.2 Study population

All patients who visited Jimma University Medical Center, department of Ophthalmology, retina clinic with retinal vascular occlusion and selected gender- age match control group of patients with ocular problem other than retinal vascular occlusive disease from 2021 to 2022.

4.3.3 Study unit

Individuals who visited Jimma University Medical Center, department of ophthalmology, retina clinic with retinal vascular occlusion and fulfilled the inclusion criteria during the study period. Selected gender- age match control group of patients with ocular problems other than retinal vascular occlusive disease who visited the ophthalmology department general OPD and different specialty clinics, and fulfilled the inclusion criteria during the study period.

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria

To be eligible for recruitment in the study case files for patients who had retinal vascular occlusion and selected gender- age match control group of patients with ocular problem other than retinal vascular occlusive disease had to be accessible in the Medical Records Department at JUMC at the time of the study.

4.4.2 Exclusion Criteria

Case files with incomplete data on patient details will be excluded from the study.

Selected gender- age match control group with incomplete data and not clearly stated diagnosis will be excluded.

4.5 Sample Size and Sampling Technique and Procedure

Study population is small thus there was no need to make sample size calculation. All study subject who meet the inclusion criteria with case and control ratio of 1:2 was included.

4.6 VARIABLES OF STUDY

4.6.1 Dependent Variable

Retinal vascular occlusion

4.6.2 Independent Variables

Socio-demographic and Socio-economic Characteristics

- Age
- Sex
- Smoking
- residence
- educational status

Medical condition

- Hypertension
- DM
- Cardiovascular diseases
- Dyslipidemia
- stroke

Ophthalmic clinical factors

- Intraocular pressure
- Glaucoma
- Refractive status
- VA

Drugs

Antihypertensive, cocaine and sildenafil.

4.7 Data Collection Tools, Personnel, and Procedures

4.7.1 Data Collection Tools and Techniques

Medical records number (identification number) of patients who have retinal vascular occlusion and selected gender- age match control group of patients with ocular problem other than retinal vascular occlusive disease from JAN 2021 to DEC 2022 was collected from retina ophthalmology clinic follow up registration logbook and then the charts of the patients was collected from medical records room. Data collection tool: questions & tables was used to guide extraction of data from the individual medical records (chart).

Trained ophthalmology resident collected Data regarding patients' demographics, medical and ophthalmic condition.

4.7.1 Data Quality Assurance

One day training was given for data collectors before data collection regarding the objective of the study and ethical issue during data collection. The principal investigator was checking the data daily for completeness, accuracy and consistency.

The questionnaire was pretested on 5% of the sample size before 1 week of actual data collection to assess its clarity, length, completeness, and consistency, and necessary modifications was made.

4.7.2 Data Management

Information was obtained via a structured data collection tool which was adjusted according to the result from the pre-test. Data entry and management was done by creating variables for data coding and assigning numerical values for quantitative analysis.

4.8 Data Analysis

Data was cleaned, assessed for missed data and was entered using Epidata version 3.1 and analyzed using SPSS for window version 27. Descriptive analysis of the data was undertaken, and results was presented in the form of tables and graphs.

Bivariate analyses were performed to assess the association of each independent variable with the outcome variable and to identify candidate variables for multivariable analysis. Candidate variables with p-value less than 0.25 in the bivariate analysis was entered to multivariable logistic regression model to identify independent predictors and the strength of association between the different variables in relation to the outcome variable was measured by adjusted odds ratio (AOR) with 95% confidence interval (CI). A P-value less than 0.05 at 95% CI as cut of point was used to declare the observed association is statistically significant.

4.9 Ethical Consideration

Ethical clearance for the study was obtained from the Ethical Review Board of Jimma University Institute of Health. Privacy of the patient was kept confidential by using codes on the checklist.

Confidentiality of information was maintained during data collection, analysis, and interpretation.

4.10 Operational definitions

Retinal vascular occlusion: it is a complete or partial obstruction of normal retinal vascular system.

Incomplete data: A chart with a lack of documentation of patient clinical presentation, duration of symptoms, complications, and clearly specified diagnosis.

Case: a patient diagnosed with RVO during the study period.

Control: a selected gender- age match group of patients with ocular problems other than retinal vascular occlusive disease who have been seen at a retina clinic during the study period.

Good vision: visual acuity >6/12.

Mild visual impairment: visual acuity <6/12 to <6/18.

Moderate visual impairment: visual acuity 6/18 to 6/60.

Sever visual impairment: visual acuity worse than 6/60

Blindness: visual acuity worse than 3/60.

4.12 Dissemination of Findings

Findings of this research will be distributed to Jimma University postgraduate and research study office. It will be presented on a national ophthalmic association meeting. It will also be made available for a publication on international journals. Further, it will be uploaded and made available on the Website of Jimma University.

CHAPTER 5: RESULT

5.1 Socio-demographic Characteristics of the study population

During the study period, a total of 1564 patients were seen in the retina clinic. Out of which, 78 patients had retinal vascular occlusion, which constitutes 4.99% of vitreo-retinal disease seen during the study period. The majority of patients with retinal vascular occlusion were male, 58 (74.4%), with a mean age of presentation of 60±14 years.

Other socio-demographic factors like educational status, occupation, and marital status are not well documented.

To assess the association of retinal vascular occlusion with the documented risk factors, 156 patients with a 1:2 age-sex matched without retinal vascular occlusion were taken from general OPD and different specialty clinics. The mean age of control cases was 58±11 years.

Table 1: Socio-demographic characteristics of participants JUMC, Jimma Southwest Ethiopia, OCT 2023.

		Patients with retinal vascular occlusion	Patients without retinal vascular occlusion
Total		78 (33.3%)	156 (66.7%)
Gender	Male	58 (77.4%)	117 (75%)
	Female	20 (25.6%)	39 (25%)
Mean age		60±14	58±11

5.2 Ophthalmic related characteristics

The majority of patients, 76 (94.7%), presented with a reduction in vision. Two patients (2.6%) one presented with blurred vision and the other presented with foreign body sensation. Twenty-one (26.9%) patients had high intraocular pressure at the time of presentation. Twenty-two (28.2%) had glaucoma, of which the majority had open-angle glaucoma, 15 (68.2%). Forty-nine patients (62.8%) were legally blind unilaterally at the time of presentation. Four patients had mild (5.1%), two patients had moderate (2.6%), and twenty patients had severe (25.5%) visual impairment at the time of presentation. The mean duration of presentation was 50.84±35 weeks.

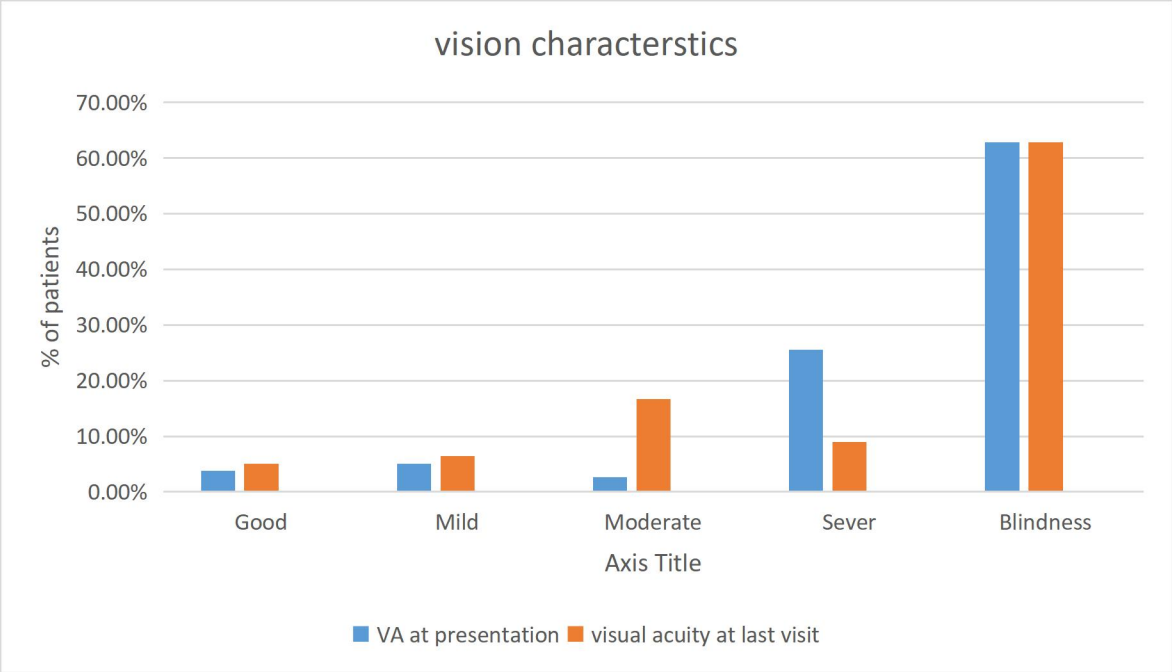


Figure 1: vision characteristics of patients attending JUMC, Retina ophthalmology clinic, Jimma southwest Ethiopia, Oct 2023

From a total of 78 patients, 41 were legally blind and had no improvement at last visit visual acuity. 6 patients had visual acuity deterioration in last visit visual acuity from sever visual impairment to blindness and 2 patients from mild to blindness. 10 patients had visual acuity improvement from sever visual impairment to moderate visual impairment.

The majority of patients with CRVO were unilaterally legally blind, 25 (60%) at the time of presentation, followed by severe visual impairment 12 (29.2%). From BRVO, 20 (62.5%) patients were legally blind at the time of presentation. Two patients (66.6%) from HRVO were blind.

The majority of the patients, 46 (58.9%), presented with more than a 6-month duration of compliant, followed by 3 (3.8%) less than 1 week and 29 (37.3%) within 1 week up to 6 months. All patients with retinal vascular occlusion had unilateral diseases, and the most affected eye was the right eye 42 (53.84%).

5.2.1 Types of retinal vascular occlusion

Retinal venous occlusion (RVO) constitutes the majority of cases of retinal vascular occlusion, 76 (97.4%). Central retinal venous occlusion (CRVO) constitutes the majority of retinal venous occlusion, 41 (53.9%), followed by branch retinal vein occlusion (BRVO), 32 (42.1%), and hemi retinal vein occlusion (HRVO), 3 (4%).

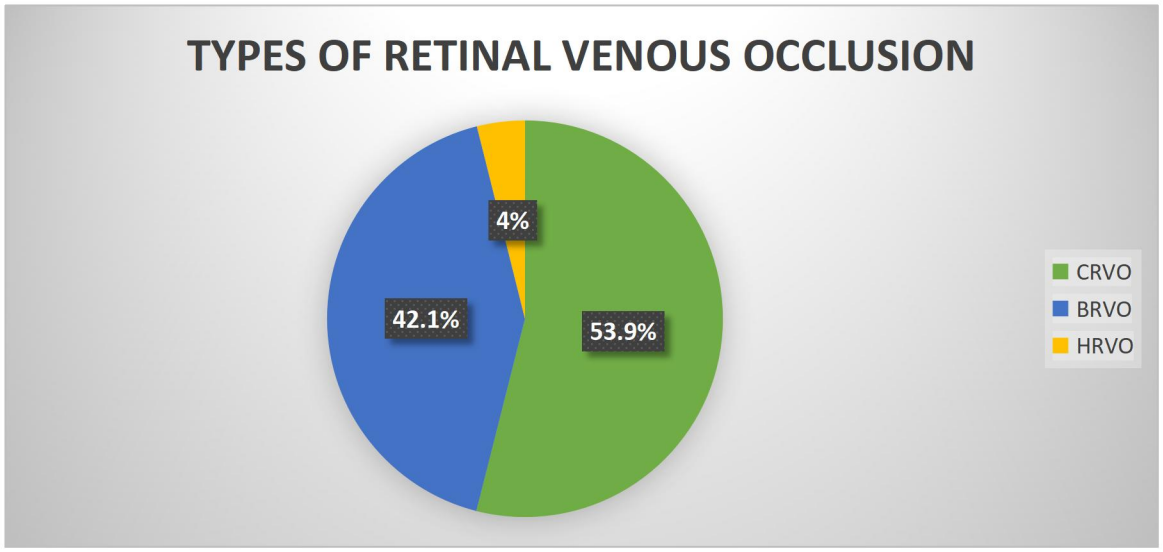


Figure 2: figure showing types of retinal vein occlusion among patients attending JUMC ,Retina Ophthalmogy Clinic, Jimma,Southwest Ethiopia, Oct 2023.

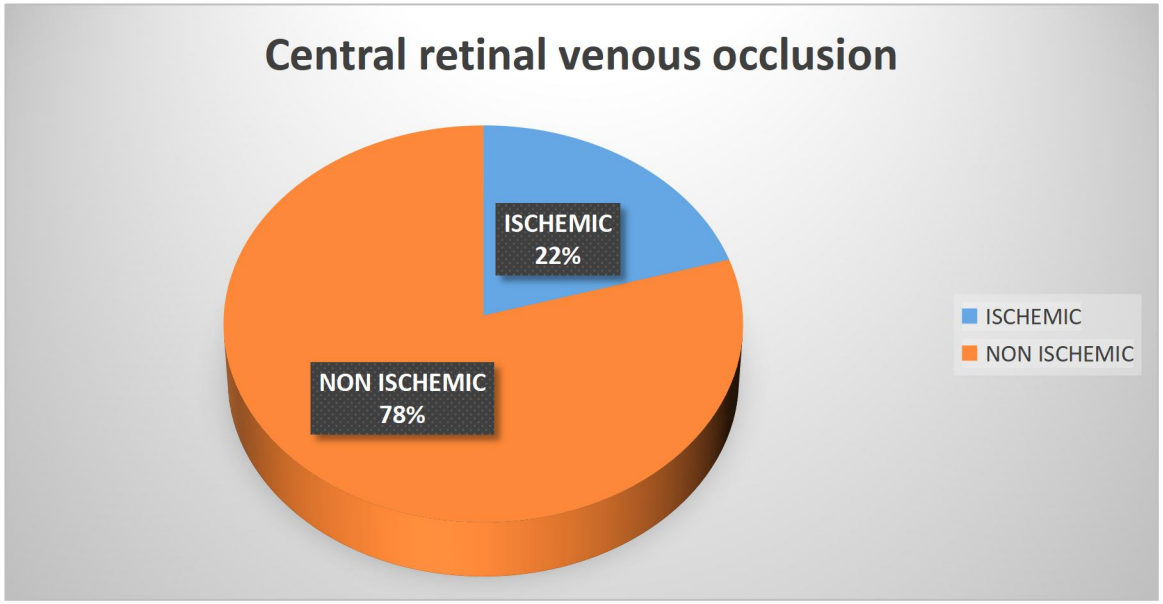


Figure 3: ischemic and non-ischemic CRVO among patients attending Jumc, Retina Ophthalmology clinic ,Jimma Southwest Ethiopia, Oct 2023.

Superotemporal occlusion accounts for 28 (87.5%) patients with BRVO, followed by inferotemporal 3 (9.4%), and inferonasal 1 (3.1%).

Only 2 (2.6%) patients had retinal arterial occlusion, of which 1 had central retinal arterial occlusion (CRAO) and 1 had branch retinal arterial occlusion (BRAO).

5.2.2 Complications of retinal vascular occlusion

From retinal vascular occlusion, 35 (44.9%) patients had complications at the time of presentation. The majority of patients had macular edema 21 (60%), followed by neovascularization 9 (25.7%), vitreous hemorrhage 3 (8.6%), and retinal detachment 2(5.7%).

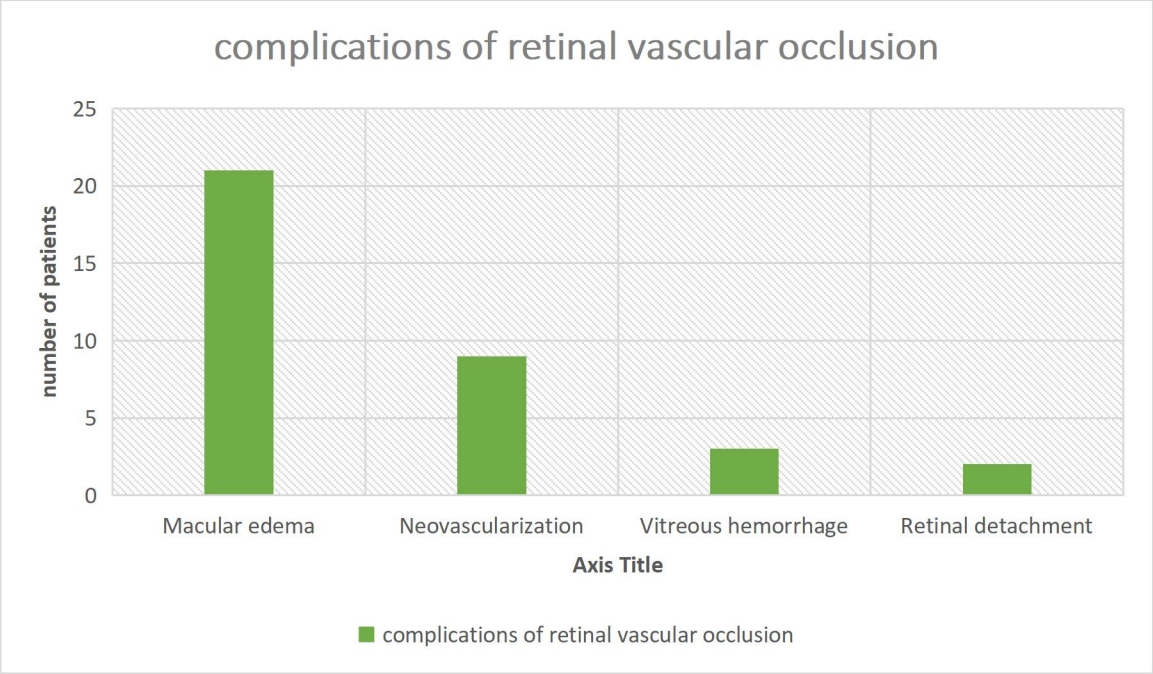


Figure 4: Complications of retinal vascular occlusion among patients attending JUMC,Retina Ophthalmology Clinic ,Jimma, southwest Ethiopia,Oct 2023

The majority of macular edema is accounted for by BRVO 10 (47.6%), followed by CRVO 8 (38.1%). Two patients (9.5%) with HRVO had macular edema at the time of presentation. One patient from BRAO (4.8%) had macular edema.

Table 2:Types of RVO with complications of study participants ,JUMC,Retina Ophthalmology clinic,Jimma ,Southwest Ethiopia,Oct 2023

COMPLICATIONS	CRVO	BRVO	HRVO	BRAO
Macular edema	8(38.1%)	10(47.6%)	2(9.5%)	1(4.8%)
VH	1(50%)	1(50%)		
RD	2(100%)			
Neovascularization	5(55.6%)	4(44.4%)		

5.2.3 Risk factors identified associated with retinal vascular occlusion

Of all patients identified with retinal vascular occlusion, 3 (3.8%) were diabetic. Fifty one (65.4%) were hypertensive; the majority were accounted for by CRVO 24 (58.5%), which is followed by BRVO 22 (68.8%). Twenty two (28.2%) had glaucoma, and the majority was accounted for by CRVO 14 (34.1%), followed by BRVO 7 (21.9%).

Other risk factors like dyslipidemia, coagulopathy, cardiovascular disease, and stroke were not documented on the chart and not assessed.

To assess the association of retinal vascular occlusion with the documented risk factors, 156 age-sex matched patients without retinal vascular occlusion were taken from general OPD and different specialty clinics.

Table 3: Medical related characteristics of study participants, JUMC, Jimma southwest Ethiopia, Oct 2023.

MEDICAL CONDITIONS	NUMBER OF PATIENTS IN CASE GROUP	NUMBER OF PATIENTS IN CONTROL GROUP
HTN	51 (65.4%)	9 (5.8%)
DM	3 (3.8%)	24 (15.4%)
GLAUCOMA	22 (28.2%)	24 (15.4%)
DYSLIPIDEMIA	5 (6.4%)	0
CVD	1 (1.3%)	1 (0.6%)

Logistic regression was done to assess the association between different variables like DM, HTN, dyslipidemia, cardiovascular disease, and glaucoma. An association was found between retinal vascular diseases, and DM, HTN, and glaucoma.

Table 4: Bivariate analysis for factors associated with retinal vascular occlusion at JUMC, Jimma, Southwest Ethiopia, Oct 2023

Variables	CASE	CONTROL	P value	COR	CI
DM	3 (3.8%)	24 (15.4%)	0.016	0.22	0.064-0.755
HTN	51 (65.4%)	27 (34.6%)	**<0.001**	**30.85**	**13.6-69.97**
CVD	1 (1.3%)	1 (0.6%)	0.873		
DISLIPIDEMIA	5 (6.4%)	0	0.999		
GLAUCOMA	22 (28.2%)	24 (15.4%)	**0.022**	**2.161**	**1.12-4.17**

For DM, HTN, and glaucoma, the adjusted odds ratio was computed. When compared to patients without HTN, patients with HTN have a 39-fold increased chance of having retinal vascular occlusion (P value of <0.001 and a 95% CI 15.77-96.81). When compared to individuals without glaucoma, patient with glaucoma have a 2.6 fold increase risk of retinal vascular occlusion (P=0.025 and 95% CI: 1.132-6.262).

Table 5: Multivariate logistic regression analysis showing risk factors associated retinal vascular occlusion among patients attending JUMC, Retina Ophthalmology Clinic, Jimma Southwest Ethiopia, Oct 2023

Variables	CASE	CONTROL	P value	AOR	CI
DM	3 (3.8%)	24 (15.4%)	0.018	0.150	0.31-4.170
HTN	51 (65.4%)	27 (34.6%)	**<0.001**	**39.082**	**15.77-96.81**
GLAUCOMA	22 (28.2%)	24 (15.4%)	**0.025**	**2.663**	**1.132-6.262**

CHAPTER 6 Discussion

The incidence of retinal vascular occlusion in general was 4.99% during the study period, with the majority (4.86%) being RVO. This figure is similar to the proportion of RVO done in Gondar (32) in a similar clinical setup. Since our study is limited to retrospective institution based data, this figure is higher than the global prevalence because most other studies are population studies, and our study will obviously overestimate the proportion of the disease (16) (27).

The age range affected is 22-102 with a mean age of 60±14 years, and the mean age is similar in studies done in Gondar (58± 10.87 years) and two studies done in Nigeria (58± 12 years, 62.7± 10 years) (32) (29). However, our patients are younger than those studies done in Nepal (69.64±7.31 years) and older than those of India (48.12±17.5 years) (27) (28).

In our setup, the majority of vascular occlusion occurred in males (74.36%). This is consistent with studies done in Gondar, Nigeria, Nepal, and Minnesota (10, 26, 28, 29). However, the male predominance does not coincide with the meta-analysis done by Peige Song et al., which showed a similar prevalence in both sexes.

In our study, almost all retinal vascular occlusions were caused by RVO (97.4%), and only two (2.6%) patients had arterial occlusions. The most common cause of RVO is CRVO (53.9%), followed by BRVO (42.1%) and HRVO (3.9%). This is in agreement with a study done in Gondar that showed CRVO (52.78%) to be more common, followed by BRVO (36.11%), and HRVO (11.11%) (32). However, this is in contrast with the recent meta-analysis of the global prevalence of RVO and the study done in Nepal, which both showed BRVO to be more common than CRVO (16, 26).

The strongest risk factor identified for retinal vascular occlusion was hypertension, which occurred in 51 (65.4%) patients, followed by glaucoma in 22 (28.2%). Hypertension was the strongest risk factor identified, with an AOR of 39.082 and a P value of <0.001 at 15.77-96.817 CI. Glaucoma also has a statistically significant association with AOR (2.663), 95% CI, and a P value of 0.025 at 1.132-6.262 CI. This is in agreement with the study done in the USA state of Michigan. In this study, systemic hypertension was the most common risk factor (OR 3.86, 95% CI =2.08-7.16) followed by glaucoma (OR 2.09, 95% CI=1.38-6.05) and male sex (OR 2.61, 95% CI= 1.43-4.79)(30). We were unable to assess the association between sexes because our

control groups were gender age matched. Systemic hypertension and glaucoma were also found to be strongly associated with central retinal vein occlusion (31). Diabetes was identified only in 3 patients with retinal vascular occlusion and 24 patients without retinal vascular occlusion and is thus not associated with retinal vascular occlusion, with an AOR of 0.150 and a P value of 0.018 This is in contrast to the already established fact that diabetes is one of the risk factors for both RAO and retinal vein occlusion (2). This is also in contrast to most other studies done (16, 27, 28). This is due to the small size of our study population.

Macular edema is the most common complication identified 21 (60%), followed by neovascularization 9 (25.7%). This is also similar to the study done in Gondar (32). Other uncommon complications were vitreous hemorrhage 3, retinal detachment 2. These later complications were not documented in the Gondar study. It was difficult to assess whether neovascular glaucoma was the complication or the cause of retinal vascular occlusion.

Forty-nine patients (62.8%) were legally blind (vision worse than count finger 3 meters) unilaterally both at the initial and final visual acuity assessment. This may be due to the late presentation of patients with irreversible complications and the lack of standard medical treatment like anti-VEGF for macular edema.

There were also a significant number of patients, 22 (28.2%) with moderate (6/60-6/18) to severe (worse than 6/60) visual impairment. Those patients with severe (25.62%) visual impairment at presentation had improvement in visual acuity at the final assessment. 13 patients with severe visual impairment at initial presentation improved in visual acuity to moderate visual impairment. CRVO is associated with blindness at the time of presentation 25 (32%), followed by BRVO 20 (26.3%), and HRVO 2 (2.63%).

Limitation of the study

Our study limited from hospital based chart review; patients were not randomized, and thus, demographic, behavioral, or clinical differences between the groups may confound the observed results. Use of secondary data sources from medical records had many blanks and not all cards were accessible.

Small number of study population is another limitation of these study.

CHAPTER 7 CONCLUSION AND RECOMMENDATION

7.1 Conclusion

The findings of our study showed that the incidence of retinal vascular occlusion was 4.99%, and CRVO was the predominant type of retinal vascular occlusion seen among study patients. Males were more frequently affected. Glaucoma and hypertension were the most frequently identified risk factors. Macular edema and neovascularization were the top two complications detected. Forty-nine (62.8%) eyes were blind at presentation. Most patients had delayed presentation with complications and irreversible blindness.

7.2 Recommendation

Retinal vascular occlusion represents an important cause of visual loss. Proper diagnostic and therapeutic set ups must be established to prevent vision loss from complications. Since delay in detection and treatment can result in irreversible visual impairment and blindness, increasing awareness among the general people and health care providers will allow for prompt early diagnosis and management, which will hopefully translate into a better visual outcome. Our study is solely based on a chart review of patients, which obviously had lots of flaws in the documentation and completeness of important clinical data. I strongly recommend that a prospective case-control study is better suited to this scenario.

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DATA COLLECTION TOOL

1. Socio-Demographic		
	Code	
	Age	
	Sex	Male
		Female
	Address	
	Educational status	
	Occupation	
	Smoking	Yes
		No
	Alcohol consumption	*Yes*
		No
2.Medical conditions	Diabetes mellitus	Yes
		No
		Unknown
	Hypertension	Yes
		No
		Unknown
	Dyslipidemia	Yes
		No
		Unknown
	Coagulopathy	Yes
		No
		Unknown
	Cardiovascular diseases	Yes
		No
		Unknown
	If yes specify	
	Stroke	Yes
		No

3.Ophthalmic history	Main compliant of the patient				
	Duration of the symptoms				
	Ocular medication history				
	Family history				
	Previous history				
4.Examination	IOP				
	VA at presentation				
	Final VA				
	BP				
5.Ophthalmic finding	5.1 Glaucoma		No		
			Yes	Angle closure	
				Open angle	
	5.2 Types of retinal vascular occlusion	Arterial	Yes		
			No		
		If arterial	OD, OS or OU		
			Central	Yes	
				No	
			Branch	No	
				Yes	
				IF YES which branch	ST
					SN
					IT
					IN

		Venous	Yes			
			No			
		If venous	OD,OS or OU			
			Central	Yes		
				No		
			Branch	Yes	Which branch	ST
						SN
						IT
						IN
				No		
			Hemi	Yes		
				No		
			Ischemic	Yes		
				No		
			Non ischemic	No		
				Yes		
		Both arterial and venous				

	Complication	*No*		
		Yes		
	If yes	Macular edema		
		Neovascularization	NVI	Yes
				No

			NVA	Yes
				No
			NVD	Yes
				No
			NVE	Yes
				No
		Retinal detachment		
	Laboratory findings			
	What was given			
	Follow up			

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of the student: _____

Date._____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor:_____

Date._____ Signature _____

APPROVAL OF THE SECOND ADVISOR

Name of the first advisor:_____

Date._____ Signature _____