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Clinical study of branch retinal vein occlusion (BRVO) in a tertiary eye care center

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ABSTRACT

Background: Branch Retinal Vein Occlusion (BRVO) is a common retinal vascular disorder which involves one of the branch retinal veins. The aim of the study is to analyse epidemiology, risk factors, clinical characteristics in the distribution of different types of BRVO and final visual outcome after treatment and six months follow up.

Materials and Methods: This is a prospective study including 222 patients of BRVO was done from October-2018 to September-2020. Clinical evalution included, detailed history with systemic risk factors, visual acuity testing, Slit-lamp biomicroscopy, Intra occular pressure, detailed fundus evaluation, fundus fluorescein angiography, Optical Coherence Tomography and Gonioscopy. Laboratory test included complete blood count, Erythrocyte sedimention rate, fasting blood sugar, serum lipid profile. Treatment given, observation and follow up, intravitreal (IV) ranibizumab, IV triamcinolone and laser photo coagulation.

Results: Out of 222 BRVO patients, 207 (94.1%) were major BRVO (129(58.1%) were suprotemporal BRVO, 66(29.8%) were inferotemporal BRVO) and 15 (5.9%) were macular BRVO. Maximum number of patients 108 (48.6%) in the age group of 61-70 years. Male patients 126 (56.7%) more than females 96 (43.3%). Right eye 117 cases (52.7%) were involved slight more than the left eye 102 cases (45.9%). Blurring of vision 162 (72.9%) is the commonest symptom. Hypertensive patients 113 (50.9%) affected more followed by Diabetic 36 (16.2%) and cardiovascular disease 33 (14.9%). Mean Systolic blood pressure (SBP), Diastolic blood pressure (DBP), ESR & Fasting blood sugar (FBS) are higher in Macular BRVO, cholesterol level is higher in Major BRVO. Retinal haemorrhage was present in all cases. Macular edema was present in 87.4% of patients in whom OCT was done. At the end of six months after treatment in majority of patients i:e 85.1% had BCVA between 6/6-6/18. There was dramatical improvement of vision after receiving intravitreal Ranibizumab (P value 0.041).

Conclusion: There is strong association of conventional risk factors with BRVO. Visual prognosis depends on initial status with careful monitoring for macular ischaemia, macular edema, development of neovascularization and subsequent neovascular glaucoma followed by appropriate therapy like IV Ranibizumab, IV Triamcinolone and laser photocoagulation etc wherever required. There is dramatical improvement of vision after receiving intravitreal Ranibizumab (P value 0.041).

1. Background

Branch retinal vein occlusion (BRVO) is a common retinal vascular disorder which involves one of the branch retinal veins and is generally less visually disabling than

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central retinal vein occlusion. Abnormal arteriovenous crossing with vein compression, degenerative changes of the vessel wall and abnormal haematological factors constitute the primary mechanism of vessel occlusion. The exact pathogenesis of this disease still remain unanswered. Risk factors are systemic hypertension, diabetes, high erythrocyte sedimentation rate, smoking, glaucoma, coagulopathies, hyperviscocity states, abnormal lipid profile and increase alcohol consumption. BRVO can occur at almost any age but typically in middle to later years, mostly in these aged above 65 years due to more conventional risk factors and their severity ranges from asymptomatic to painfulblind eye. More severe forms manifest as unremitting macular edema, vitreous haemorrhage, neovascular glaucoma or even tractional retinal detachment which can be decreases by early diagnosis and appropriate therapy. Laber was first person to report a case of BRVO.[1] Hayreh in 1994 categorised BRVO into two distinct entities : 'Major BRVO', when one of the major branch retinal vein is occluded, and 'macular BRVO', when one of the macular venules is occluded. Each carries its own prognosis.[2]

The mainstay of treatment of BRVO is by intravitreal vascular endothelial growth factor inhibitors (anti - VEGF), intravitreal triamcinolone or laser photocoagulation to prevent or treat neovascularization and macular edema and improved vitrectomy technique for advanced cases. Arteriovenous sheathotomy, hemodilution are being tried out.

2. Materials and Methods

This is a prospective study including 222 patients seen consecutively at the Department of Ophthalmology, in a tertiary Eye care center in state of Odisha. The study period was from October 2018 to September 2020. Ethical committee clearance was taken.

2.1. Case Definition of BRVO

Initially either flame shaped, dot or blot haemorrhages and dilation and tortuosity of retinal veins in the distribution of occluded branch retinal vein with the apex of the obstructed tributary system located at an arterio - venous crossing.

2.2. Inclusion criteria

1. Diagnosed case of branch retinal vein occlusion.
2. Age >18 years.
3. Patients with complete medical and laboratory examination.

2.3. Exclusion criteria

1. Old BRVO with PRP.
2. Old debilitated patients who cannot undergo Fundus Fluorescein Angiography (FFA) and will not come for follow up.
3. Young patients with inflammatory retinal disease.
4. Patients having other occular disease like cataract, corneal opactity, diabetic retinopathy, optic atrophy and any other occular disease affecting visual status or interfering with fundus photography and documentation.
5. Patient refusal.
6. Patient lost to follow up.

Clinical evaluation included a detailed history with special emphasis on the presence of systemic hypertension, diabetes millitus, cardio vascular disease, alcohol consumption, smoking, glaucoma. All patients underwent complete ophthalmologic examinations including visual acuity testing with best correction (BCVA), slit lamp biomicroscopy for anterior segment examinations, intraocular pressure (IOP) recording by applanation tonometry, detailed fundus evaluation with indirect ophthalmoscope and fundus photography by fundus camera to locate retinal haemorrhage, venous obstruction, retinal and macular edema, neovascularization. Fundus Fluorescein Angiography (FFA) was done after 3 months of presentation for non responding patients when retinal haemorrhages cleared sufficiently to look for macular edema, neovascularization, macular nonperfusion and capillary nonperfusion> 5 DD and Optical Coherence Tomography (OCT) was carried out whether macular edema is present or not. Goiniscopy was done to know the angle status.

Blood pressure measurement and electrocardiogram (ECG) were done in all cases. Patients with hypertension were defined as those with systolic pressure > 140 mmHg or diastolic pressure > 90 mmHg. ECG were read by cardiologists and reported whether normal or abnormal. Laboratory tests included complete blood count, Erythrocyte Sedimentation Rate (ESR), Fasting Blood Sugar (FBS), Serum lipid profile (total plasma cholesterol, triglyceride, LDL).

Treatment given varied among patients basing on visual acuity of patients, complications of disease and patients' socioeconomic status. Some patients were kept under observation and followed up. Others were given intravitreal Ranibizumab or intravitreal triamcinolone or laser photocoagulation.

2.4. Treatment protocol

1. Macular edema (ME) - IV Ranibizumab, IV Triamcinolone, Grid laser photocoagulation.
2. Neo vascularization disc (NVD) / Neo vascularization Elsewhere (NVE): Sectoral laser photocoagulation.
3. Vitreous haemorrhage - Parsplanavitrectomy and endo laser (PPV and EL).

Treatment of underlying systemic condition, if found, was routinely done.

Follow up visits were performed after 1^{st} month, 2^{nd} month, 3^{rd} month and at 6^{th} month. After each follow up visit appropriate treatment was given.

3. Observation

Table 1: Disease distribution

Type of BRVO	Total No. of Patients
Major BRVO	207(94.1%)
Macular BRVO	15(5.9%)
Total	222(100%)

The study group included total 222 patients out of which 207 (94.1%) where major BRVO and 15(5.9%) patients were macular BRVO.Table 1

Table 2: Age distribution

Age in years	Major BRVO	Macular BRVO	Total No. of patients
41-50	12(5.8%)	3(20%)	15(6.8%)
51-60	69(33.3%)	3(20%)	72(32.4%)
61-70	99(47.8%)	9(60%)	108(48.6%)
71-80	27(13.1%)	0	27(12.2%)
Total	207	15	222

Out of total 222 patients, between 41-50yr age group the number of total BRVO patients were 15(6.7%),from 51-60yr age group the number of patients were 72(32.4%), from 61-70yr age group the number of patients were 108(48.6%) and from 71-80yr age group the number of patients were 27(12.1%). From 61-70yr age group there were maximum number of patients i.e. 108(48.6%) and the overall age range was 41-80 years.Table 2

3.1. Output

1. In this study majority of cases belongs to age group 61-70.
2. Mean age of is 62.89 and S.D. is 7.96, where the age group distribution is positively skewed shows maximum values are clustered left tail of the distribution.Tables 3 and 4

7% patients were male and 96(43 3% were female. Table 5

In major BRVO out of total 222 patients, patients, right eye was involved in 114(55.1%) cases and left eye was involved in 90(43.5%) cases and both eye was involved in 3(1.4%) case. Out of 15 Macul.ar BRVO right eye was involved in 3(20%), left eye in 12(80%) and in no case both eye was involved.Table 6

Maximum number of patients, 162(72.9%) presented with blurring of vision.Table 7

Out of 207 Major BRVO patients 129(58.1%) were at supero temporal quadrant and 66(29.8%) were at infero temporal quadrant, 9(4.1%) were at superonasal and 3(1.3%) were in inferonasal quadrant.Table 8

Out of total 207 patients of major BRVO, 103(49.7%) were hypertensive, 33(15.9%) had cardiovascular disease, 33(15.9%) had Diabetes Mellitus, 9(4.3%) had Glaucoma, 21(10.6%) patients were Alcoholic, 18(8.7%) patients were smoker and 12(5.8%) patients had abnormal lipid profile.Table 9

Out of 15 patient with macular BRVO 10(66.7%) were hypertensive, 3(20%) were diabetic,3(20%) patient was smoker.

Majority of cases i.e. 158(71.2%) had BCVA between 6/24-6/60, 30(13.5%) cases had BCVA 6/6-6/18 and rest 34(15.3%) cases had BCVA < 6/60.Table 10

Retinal haemorrhage was present universally in all cases, macular edema was present in 111(50%) cases, Cotton wool spots were present in 102(45.9%) cases, retinal edema in 93(41.8%) cases, and neovascularization in only 9 (4.05%) cases,Vitreous haemorrhages in 5(2.2%) cases, TRD+FVP in 6(2.7%) cases.Table 11

8% cases had macular edema and rest 27(12.2% did not have macular edema.Table 12

Out of 207 patient of major BRVO at the time of presentation, 12 (5.8%) were kept under observation, 9 (4.3%) patients were given intravitreal triamcinolone and 177 (85.5%) patients were given intravitreal ranibizumab.

Out of 15 patient of macular BRVO, 3 (20%) patients were kept under observation and 12(80%) patients were given intravitreal ranibizumab.Table 13

Out of 222 patient of BRVO at the time of presentation, 15 (16.8%), were kept under observation, 9 (4.1%) patients were given intravitreal triamcinolone and 189 (85.1%) patients were given intravitreal ranibizumab.

From study, it is clear that Mean SBP, DBP, ESR & FBS are higher in Macular BRVO than Major BRVO, where only cholesterol level is higher in Major BRVO.Table 15

Value much less than 0 05 (95% C I shows significance of the test.Table 16

Correlation is significant at the 0.01 level (2-tailed).

Correlation is significant at the 0.05 level (2-tailed).Table 17

At one month follow up, out of 222 patients, 144 (64.9%) patients were kept under observation, 3 (1.4%) patients were given IV triamcinolone and 75 (33.7%) were given IV Rranibizumab to those whose visual acuity get worsened or did not improve.Table 18

At 2nd month of follow up the result is quiet better.196 (88.3%) patients improved their VA.But 23(11.1%) major BRVO cases and 3(20%) macular BRVO cases were given 3^{rd} dose of intravitreal Ranibizumab.Table 19

Despite 2^{nd} dose of intravitreal Ranibizumab and Triamcinolone, some patients did not show improvement.so

Table 3:

Statistics			
		Type	**Age_group**
N	Valid	222	222
	Missing	0	0
Mean			62.89
Std. Deviation			7.963
Skewness			.108
Std. Error of Skewness			.163
Kurtosis			-.579
Std. Error of Kurtosis			.325
Minimum			47
Maximum			80

Table 4:

Descriptive statistics							
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**Skewness**	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Std. Error**
Age_group	222	47	80	62.89	7.963	.108	.163
Valid N (listwise)	222						

Table 5: Sex distribution

Sex	**Major BRVO**	**Macular BRVO**	**Total No. of patients**
Male	117(56.5%)	9(60%)	126(56.7%)
Female	90(43.5%)	6(40%)	96(43.3%)
Total	207	15	222

Table 6: Laterality

Sex	**Major BRVO**	**Macular BRVO**	**Total No. of patients**
Right eye	114(55.1%)	3(20%)	117(52.7%)
Left eye	90(43.5%)	12(80%)	102(45.9%)
Both eye	3(1.4%)	0	3(1.4%)
Total	207	15	222

Table 7: Presenting symptoms

Presenting symptoms	**Major BRVO**	**Macular BRVO**	**Total No. of patients**
Asymptomatic	9(4.4%)	6(40%)	15(6.75%)
Sudden gross diminution of vision	15(7.2%)	2(20%)	18(8.2%)
Blurring of vision	156(75.4%)	6(40%)	162(72.9%)
Black spots	15(7.2%)	0	15(6.75%)
Photopsia	12(5.8%)	0	12(5.4%)
Total	207	15	222

Table 8: Sector involved in major BRVO

Sector involved	**Total No. of cases**	**Percentage**
Supero temporal	129	58.1
Supero nasal	9	4.1
Infero temporal	66	29.8
Infero nasal	3	1.3
Macular	15	6.7
Total	222	100

Table 9: Risk factors

Risk factor	Major BRVO	Macular BRVO	Total No. of patients
Hypertension	103(49.7%)	10(66.7%)	113(50.9%)
Cardiovascular disease	33(15.9%)	00	33(14.9%)
Diabetes mellitus	33(15.9%)	03(20%)	36(16.2%)
Glaucoma	09(4.3%)	00	09(4.1%)
Alcohol consumption	21(10.1%)	00	21(9.45%)
Smoking	18(8.7%)	03(20%)	21(9.45%)
Abnormal lipid profile	12(5.8%)	00	12(5.4%)

Table 10: BCVA at presentation

Presenting VA	Major BRVO	Macular BRVO	Total No. of patients
6/6-6/18	27(13.1%)	3(20%)	30(13.5%)
6/24-6/60	152(73.4%)	6(60%)	158(71.2%)
<6/60	28(13.5%)	6(60%)	34(15.3%)
Total	207	15	222

Table 11: Ophthalmoscopic findings at presentations

Ophthalmoscopic finding	Major BRVO	Macular BRVO	Total no. of patients
Retinal Hemorrhage	207(100%)	15(100%)	222
Cotton wool spots	93(44.9%)	09(60%)	102
Retinal edema	84(40.6%)	09(60%)	93
Macular edema	99(47.8%)	12(80%)	111
Neovascularisation	09(4.3%)	00	09
Vitreous hemorrhage	05(2.41%)	00	05
TRD + FVP	06(2.9%)	00	06

Table 12: OCT findings

OCT findings	Major BRVA	Macular BRVA	Total
Macular Edema present	180(87%)	15(100%)	195(87.8%)
Macular Edema absent	27(13%)	0	27(12.2%)

Table 13: Treatment modalities at presentation

Treatment modalities at presentation	Major BRVO	Macular BRVO	Total	P value
Wait and watch	12(5.8%)	3(20%)	15(6.8%)	0.01
Grid laser photocoagulation	0	0	0	-
Sector laser photocoagulation	0	0	0	-
Intra vitreal Triamcinolone	9(4.3%)	0	9(4.1%)	0.403
Intravitreal Ranibizumab	177(85.5%)	12(80%)	189(85.1%)	1.00
PPV+MP+EL	6(2.9%)	0	6(2.7%)	1.00
PPV+MP+EL+SOI	3(1.5%)	0	3(1.4%)	1.00

Table 14: Relationship between SBP, DBP, ESR, FBS and Cholestrol

Mean	Major BRVO	Macular BRVO
SBP	141.78	153.6
DBP	85.15	86.4
ESR	14.34	15.8
FBS	101.27	106.6
Cholestrol	159.9	153.3

Table 15:

Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SBP	222	100	186	142.58	22.046
DBP	222	68	110	85.24	8.654
ESR	222	8	24	14.45	4.262
FBS	222	69	168	101.64	26.845
Cholestrol	222	134	230	159.54	17.776

Table 16:

One-Sample Test

	Test Value = 95					
	T	**Df**	**Sig. (2- tailed)**	**Mean Difference**	**95% Confidence Intervalof the Difference**	
					Lower	Upper
SBP	32.157	221	.000	47.581	44.67	50.50
DBP	-16.797	221	.000	-9.757	-10.90	-8.61
ESR	-281.595	221	.000	-80.554	-81.12	-79.99
FBS	3.683	221	.000	6.635	3.08	10.19
Cholestrol	54.099	221	.000	64.541	62.19	66.89

Table 17:

Correlation

		Age_ Group	DBP	SBP	FBS	ESR	Cholestrol
AGE	Pearson Correlation	1	.095	.092	.041	.113	-.004
	Sig. (2-tailed)		.160	.171	.541	.094	.953
	N	222	222	222	222	222	222
DBP	Pearson Correlation	.095	1	.580**	.161*	-.088	.214**
	Sig. (2-tailed)	.160		.000	.016	.192	.001
	N	222	222	222	222	222	222
SBP	Pearson Correlation	.092	.580*	1	.194**	-.031	.140*
	Sig. (2-tailed)	.171	.000		.004	.648	.037
	N	222	222	222	222	222	222
FBS	Pearson Correlation	.041	.161*	.194**	1	.162*	.003
	Sig. (2-tailed)	.541	.016	.004		.016	.960
	N	222	222	222	222	222	222
ESR	Pearson Correlation	.113	-.088	-.031	.162*	1	.032
	Sig. (2-tailed)	.094	.192	.648	.016		.634
	N	222	222	222	222	222	222
Cholestrol	Pearson Correlation	-.004	.214*	.140*	.003	.032	1
	Sig. (2-tailed)	.953	.001	.037	.960	.634	
	N	222	222	222	222	222	222

Table 18:

Treatment Modality at 1st month follow up:

Treatment modality at 1^{st} month follow up	**Major BRVO**	**Macular BRVO**	**Total**
Wait & Watch	138(66.7%)	0	138(62.2%)
Grid laser photocoagulation	0	0	0
Sector laser photocoagulation	0	0	0
Intra vitreal Triamcinolone	3(1.4%)	0	3(1.6%)
Intravitreal Ranibizumab	66(31.9%)	0	66(29.7%)

Table 19:

Treatment modality at 2^{nd} month follow up **Treatment Modality at 2^{nd} month follow up**	**Major BRVO**	**Macular BRVO**	**Total**
Wait and watch	183(88.4%)	13(86.7%)	196(88.3%)
Grid laser photocoagulation	0	0	0
Sector laser photocoagulation	0	0	0
Intra vitreal Triamcinolone	0	0	0
Intravitreal Ranibizumab	23(11.1%)	3(20%)	26(11.7%)

Table 20: FFA findings

FFA findings	**Major BRVO**	**Macular BRVO**	**Total**
Neovascularization	6	0	6
Macular edema	12	3	15
Macular Non perfusion	3	0	3
Capillary Non perfusion >5DD	3	0	3

FFA was done. It was found that 6 patients had neovascularisation, 15 patients had persistant macular edema, 3 patients had Macular non perfusion and 3 macular BRVO patients had capillary non perfusion >5DD.Table 20

So at 3^{rd} month follow up,Grid laser photocoagulation done in 6 (2.9%) major BRVO cases, sector photocoagulation done in 3 (1.4%) major BRVO cases and 3^{rd} dose of intravitreal Ranibizumab given in 6(2.9%) in major BRVO cases and 3(20%) cases in macular BRVO.

At 3 month follow up, out of 207 patients of major BRVO, 192 (92.7%) patients were kept under observation, 6(2.9.%) patients were given grid laser photocoagulation, 3(1.4%) patients were given sector laser photocoagulation and 6(2.9%) patients were given IV Ranibizumab.Table 21

Out of 15 patients of macular BRVO, 12 (80%) patients were kept under observation and 3(20%) patients were given IV Ranibizumab.

All patients were kept under observation at 6 month follow up.Table 22

Out of total 207 patients of major BRVO, 180 (86.95%) had BCVA between 6/6 to 6/18, 21 (30.4%) patients had BCVA of 6/24 to 6/60 and 6 (2.9%) had BCVA of <6/60 after 6 months of follow up. Out of 15 cases of macular BRVO, 9(60%) had BCVA of 6/6 to 6/18 and 6(40%) had BCVA of 6/24 to 6/60.Table 23

Compiling it was found that in BRVO majority of patients i.e. 189 (85.1%) patients had BCVA between 6/6-6/18, 27 (12.2%) cases had BCVA of 6/24 to 6/60 and only 6(2.7%) patients had BCVA <6/60.

In our study, out of 222 sample size, we have given intravitreal injection in 177 patients at presentation, 66 patients were givern 2^{nd} dose of iv Ranibizumab, 23 patients were given 3^{rd} dose of Ranibizumab. At the end of 3 month 9 patients received intravitreal Ranibizumab.6 patients had grid laser photocoagulation after 3 months (p value 0.076), 3 patients got sector laser photocoagulation (p value 0.09.

Hence our study showed that there is dramatical improvement of vision after receiving intravitreal Ranibizumab (p value0.041) which are statistically significant.

Out of total 207 patients of Major BRVO, 23 (11.1%) patients had persistent macular edema, 4(5.7%) had NVE, 8(3.8%) vitreous haemorrhage, 6(2.8%) had retinal detachment as complication. Out of 15 patients with macular BRVO, only 1(6.6%) patient had recurrent macular edema.Table 24

Out the data, out of total 222 patients of BRVO, 24 (10.8%) patients had recurrent macular edema and 4 (5.4%) had NVE as complication.

4. Discussion

In our study we got more number of patients with major BRVO 207(94.1%) than macular BRVO 15(5.9%). Maximum number of patients were between 61-70 years. Mean age is 62.89 years. This could be due to more conventional risk factors at this age. This is in accordance with the study by Duke Elder (average age 60 years)[3] and Zhao et al, mean age 63.7 years (range 31-80 years).[4] There were 56.7% male and 43.3% female patients. This may be due to males are more concerned for their health and come for regular check up. As per Joffe et al there was equal incidence of male:female.[5] The Eye Disease Case Control Study group, men to women was 53%:43%.[6] Supero temporal retina involve more frequently than infero temporal in major BRVO patients which is in accordance with studies by Ammann[7] and Weinberg DV et al[8]. Hypertension 113(50.9%), Diabetes 36(16.2%) and cardiovascular disease 33(14.9%) are major risk factors for BRVO. Appiah AP et al in his case control study with BRVO, hypertension was noted in 58% patients.[9] This is same as The Beaver Dam Eye Study.[10] From our study the mean SBP, DBP, ESR and FBS were higher in

Table 21: Treatment modality at 3^{rd} month follow up

Treatment Modality at 3^{rd} month follow up	Major BRVO	Macular BRVO	Total	P value
Wait and watch	192(92.7%)	12(80%)	204(91.9%)	0.738
Grid laser Photocoagulation	6(2.9%)	0	6(2.7%)	0.076
Sector laser photocoagulation	3(1.4%)	0	3(1.3%)	0.988
Intra vitreal Triamcinolone	0	0	0	-
Intravitreal Ranibizumab	6(2.9%)	3(20%)	9(4.1%)	0.041

Table 22: Treatment modality at 6^{th} month follow up

Treatment Modality at 6^{th} month follow up	Major BRVO	Macular BRVO	Total
Wait and watch	207(100%)	15(100%)	222(100%)
Grid laser photocoagulation	0	0	0
Sector laser photocoagulation	0	0	0
Intra vitreal Triamcinolone	0	0	0
Intravitreal Ranibizumab	0	0	0

Table 23: Final BCVA at 6^{th} month follow up:

BCVA at 6^{th} month follow up	Major BRVO	Macular BRVO	Total No. of patients
6/6 – 6/18	180(86.95%)	9(60%)	189(85.1%)
6/24 – 6/60	21(10.15%)	6(40%)	27(12.2%)
<6/60	6(2.9%)	0	6(2.7%)
Total	207	15	222

Table 24: Complications observed after 6 months

Complication	Major BRVO	Macular BRVO	Total
Recurrent macular edema	23(11.1%)	1(6.6%)	24(10.8%)
NVE	4(5.7%)	0(0%)	4(5.4%)
Vitreoues hemorrhage	8(3.8%)	0(0%)	8(3.6%)
Retinal detachment	6(2.8%)	0(0%)	6(2.7%)

macular BRVO than major BRVO, where only cholesterol level is higher in major BRVO. Majority (71.2%) of BRVO patients presented with initial BCVA within 6/24 to 6/60 and 13.5% of patients had BCVA worse than 6/60 at presentation. Common ophthalmoscopic findings are retinal haemorrhage (100%), macular edema (47.8%), cotton wool spots (44.9%). By OCT 195(87.8%) patients were detected with macular edema. Out of 222 sample size, we have given intravitreal injection of Ranibizumab in 177 patients at presentation, 66 patients were given 2^{nd} dose of IV Ranibizumab, 23 patients were given 3^{rd} dose of IV Ranibizumab. At the end of 3 months 9 patients received IV Ranibizumab. 6 patients had grid laser photocoagulation after 3 months (P value- 0.076), 3 patients got sector laser photocoagulation (P value 0.988). Hence our study showed there is dramatical improvement of vision after receiving IV Ranibizumab (P value 0.041) which is statistically significant. It is also similar with other studies. BRAVO STUDY suggests the improvements from base line are maintained with IV Ranibizumab in patients with macular edema following retinal vein occlusion. MARVEL study found that Ranibizumab improves VA by 2.53 letters than Bevacizumab. IV Triamcinolone and Grid laser photocoagulation are equally effective in reducing macular edema with few limitations. The Branch Vein Occlusion Study (BVOS) group established the efficacy of Grid pattern laser photo coagulation for treatment of macular edema in BRVO.[11] The Score Study found IV Triamcinolone to be effective as macular grid laser photocoagulation treatment which is the current benchmark for BRVO treatment in case of chronic macular edema with VA below 6/12 in absence of macular capillary non-perfusion. Branch Vein Occlusion Study (BVOS) group established peripheral scatter laser photocoagulation significantly reduced the development of retinal neovascularization and vitreous haemorrhage.[12]

At the end of six months, in majority of patients that is 85.1% had BCVA between 6/6 to 6/18, only 2.7% of patients had BCVA<6/60. Out of total 222 patients of BRVO, 10.8% patients had recurrent macular edema, 5.4% had NVE, 3.6% had vitreous haemorrhage, 2.7% had retinal detachment as complication at last visit so recurrent macular edema was responsible for non-resolving of BRVO in some patients who responded poorly to the treatment.

5. Conclusion

Multiple factors are involved in the pathogenesis of BRVO. Conventional risk factors like hypertension diabetes and cardiovascular diseases are highly associated with BRVO. The mean SBP, DBP, ESR, FBS are higher macular BRVO than major BRVO, where only cholesterol level is higher in major BRVO. Macular edema, macular non-perfusion and vitreous haemorrhage resulting from retinal neovascularization are common causes of reduced vision. IV Ranibizumab, Grid laser photocoagulation, IV Triamcinolone and sector laser photocoagulation are effective treatment for BRVO, although these lack sufficient evidences. There is dramatical improvement of vision after receiving IV Ranibizumab (P value 0.041) which is statistical significant. Visual prognosis depends on initial status with careful monitoring for macular ischaemia, macular edema, development of neovascularization and subsequent neovascular glaucoma.

6. Source of Funding

None.

7. Conflicts of Interest

There is no conflict of interest.

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