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# VITREORETINAL DISEASES IN OUTPATIENT DEPARTMENT OF BALI MANDARA EYE HOSPITAL IN 2019

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**Abstract**

***Introduction:*** *The purpose of this study is to identify pattern and distribution of vitreo-retinal (VR) diseases in Bali Mandara Eye Hospital*

***Methods:*** *A retrospective descriptive study was conducted for this study. We reviewed all medical records of new patient diagnosed with VR diseases, from 1 January to 31 December 2019. We recorded and measured demography, history of systemic and eye disease, symptoms and onset, ophthalmic examinations, diagnostic investigations, final diagnoses, therapies, and the completion of the visit.*

***Result:*** *Out of 2118 total visits, we found 1191 new cases with VR diagnosis. Male to female ratio was 1.3:1. We found group of 46-65 years are represented in 678 cases (56.9%). Type 2 diabetes mellitus was the most commonly found as a systemic disease (15.5%), followed by the combination of diabetes and hypertension (14%) and hypertension alone (12.9%). History of previous cataract surgery was found in 174 cases (14.6%). Out of 1191 patients, 553 patients (46.4%) were blind. The most common diagnosis was diabetic retinopathy (24.3%), followed by rhegmatogenous retinal detachment (14.2%), and pathological myopia (8.9%). Diabetic retinopathy and pathological myopia affected both eyes in 257 cases (88.6%) and 96 cases (90.6%), respectively, while rhegmatogenous retinal detachment affected one eye in 164 cases (97%). Proliferative diabetic retinopathy was found in 173 cases (59.7%).*

***Conclusion:*** *Diabetic retinopathy and rhegmatogenous retinal detachment were the most two common diagnoses. Proliferative type was slightly common than Non Proliferative Diabetic Retinopathy. As diabetes and hypertension were the most systemic conditions we found, a collaboration with another department is needed to create a strategic screening system and an early detection. An evaluation related to rhegmatogenous retinal detachment is needed to decrease the number of cases.*

**Keywords:** retinal diseases, diabetic retinopathy, blindness, Bali, Indonesia
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## INTRODUCTION

VR diseases has become one of the causes of global visual impairment and blindness both in children and adults.[1] Age macular degeneration is the third most common cause of irreversible blindness worldwide that is mostly found in the elderly. In the meantime, diabetic retinopathy is the fifth most common cause of blindness which tends to increase among working age population.[2,3,4]

Diabetes mellitus and hypertension are often mentioned as the underlying diseases for the emergence of retinal abnormalities.[4] In Asia alone, problems in VR are estimated to increase as there is an increase in the number of people with diabetes mellitus in 2030.[5] Parallel with these, Riskesdas data show an increase in the prevalence of diabetes mellitus by 1.6% between 2013 and 2018 in Indonesia. The prevalence of hypertension was also increased by 8.3% compared to the previous five years.[6,7,8]

In Indonesia, epidemiology data of VR diseases is still limited. Based on data from Bali Mandara Eye Hospital in January 2020, VR diseases are the most common cases found in the outpatient department (36%) compared to other eye diseases. The majority of these VR diseases are retinal detachment with retinal break (10%), followed by vitreous opacity (8%), tractional retinal detachment (6%), diabetic retinopathy (6%), and others (6%).[9] However, this study only used small sample size and unmeasured study method therefore it's not truly representative.

This study is our initial attempt to determine the description and pattern of VR diseases in the Outpatient Department of Bali Mandara Eye Hospital, as a referral center for VR diseases in Eastern Indonesia.

## METHODS

This study was conducted at Bali Mandara Eye Hospital. Bali Mandara Eye Hospital is a tertiary eye hospital, owned by the local government of Bali Province, located in Denpasar. This hospital accepts referrals for eye diseases from all hospitals in Bali and eastern Indonesia. Ophthalmic services are provided by subspecialists in their respective fields.

This study was a retrospective descriptive study with consecutive sampling methods. Thus, We enrolled 1191 patients from 2118 patients who visited during a year. Data were taken from medical records of all new VR cases during the period of 1 January 2019-31 December 2019. There is no age limit in this study. The exclusion criteria were all medical records stating that someone had come and received therapy from the VR department before 1 January 2019 and after 31 December 2019

The study enrollment started on 1 July 2020, immediately after ethics approval obtained from ethics commitee of Bali Mandara Eye Hospital. The study was recorded in research instruments while maintaining the confidentiality of patient medical record data. The variables that were measured included: demographics, history of systemic disease, history of eye disease, history of systemic medication, onset of symptoms, Best Corrected Visual Acuity (BCVA) on first visit at the VR department, intraocular pressure, type and frequency of laboratory and diagnostic tests, diagnosis of VR diseases, VR interventions that were done, and completion of visit.

The demographic variables were recorded based on the identity card on the medical record. Age grouping in this study used a modified International Classification of Disease for General Purpose.[10] Occupation variables were categorized into groups of unemployed, employees, self-employed, farmers, laborers, and others. Employees are defined as civil servants and private employees. The definition of unemployed was namely housewives, children who are still in school, and also retirees. Laterality of blindness was classified into unilateral or bilateral. BCVA was classified based on the ICD 10 classification for visual impairment as mentioned below:

- Mild visual impairment: ≥ 6/18
- Moderate visual impairment: 6/24 to 6/60
- Severe visual impairment: <6/60 to 3/60
- Blindness: <3/60 to No perception of light.

VR diseases with bilateral impact on vision were assessed as visual impairment in the better eye using ICD 10 visual classification as mentioned above.

In this study, we differentiated diabetic retinopathy into Non-Proliferative Diabetic Retinopathy (NPDR) and Proliferative Diabetic Retinopathy (PDR). We processed the initial data using excel spreadsheet software and analyzed the data with the SPSS software (version 25, IBM, New York, NY).

## RESULTS

From a total of 2118 patients who visited the VR department throughout 2019, 1191 new cases met the inclusion criteria. There were 667 (56%) males and 524 (44%) females giving a male: female ratio of 1.3: 1. The youngest patient was 5 years old, and the oldest was 92 years old. Between the age groups, the group of 46-65 years old (678 cases, 56.9%) accounted for majority visits to VR department. The majority of patients came from Bali (1104 cases, 92.7%) and mostly came from Denpasar (355 cases, 32.2%) compared to eight other regions in Bali. Most of the patients were employees (35.4%), and senior high school graduates were the most common educational level (36.5%).

Type 2 Diabetes Mellitus (DM) was found in 185 cases (15.5%), a combination of DM and hypertension in 167 cases (14%), and hypertension in 154 cases (12.9%). Other systemic conditions such as heart, kidney, stroke, tuberculosis, thyroid disorders, rubella, vitiligo, bone tumors, and Systemic Lupus Erythematous (SLE) are present in only a small amount of patients. Meanwhile, Type 1 DM was obtained as much as 0.1% of the total cases. A total of 637 cases (53.5%) had no recorded systemic conditions.

There was 174 cases with history of cataract surgery (14.6%) accompanied VR diseases. This was followed by refractive error in 158 cases (13.3%), trauma in 22 cases (1.8%), glaucoma in 18 cases (1.5%), history of previous retinal laser from other hospital in 16 cases (1.3%), history of vitrectomy from other hospital in 6 cases (0.5%), history of LASIK in 3 cases (0.3%),

Table 1. **Demographic Characteristics**

| Parameters | N (Total = 1191) | Percent (%) |
|---|---|---|
| **Sex** | | |
| Female | 524 | 44.0% |
| Male | 667 | 56.0% |
| **Age** | | |
| May-17 | 15 | 1.3% |
| 18-25 | 67 | 5.6% |
| 26-45 | 231 | 19.4% |
| 46-65 | 678 | 56.9% |
| >65 | 200 | 16.8% |
| **Origin** | | |
| Bali | 1104 | 92.7% |
| Banten | 2 | 0.2% |
| DKI Jakarta | 1 | 0.1% |
| West Java | 1 | 0.1% |
| Central Java | 2 | 0.2% |
| East Java | 19 | 1.6% |
| Central Borneo | 1 | 0.1% |
| East Borneo | 3 | 0.3% |
| West Nusa Tenggara | 37 | 3.1% |
| East Nusa Tenggara | 16 | 1.3% |
| Papua | 1 | 0.1% |
| Central Sulawesi | 1 | 0.1% |
| Southeast Sulawesi | 3 | 0.3% |
| **Education** | | |
| Not graduated primary school | 71 | 6.0% |
| Primary school | | |
| Junior high school | 246 | 20.7% |
| Senior high school | 124 | 10.4% |
| Bachelor or higher | 435 | 36.5% |
| | 315 | 26.4% |
| **Occupation** | | |
| Unemployed | 365 | 30.6% |
| Employee | 422 | 35.4% |
| Self-employed | 235 | 19.7% |
| Farmer | 115 | 9.7% |
| Laborer | 36 | 3.0% |
| Teacher | 12 | 1.0% |
| Doctor | 4 | 0.3% |
| Fisherman | 2 | 0.2% |

history of previous anti VEGF injection from other hospital in 2 cases (0.2%), history of previous scleral buckle in other hospital 2 cases (0.2%) and other conditions which are a combination of above conditions. A total of 754 cases (63.3%) had no history of eye diseases.

The use of insulin was recorded in 67 patients (5.5%), 41 patients with oral antidiabetic drugs (3.4%), 19 patients (1.59%) were on antihypertensive therapy and blood vessel disorders, and one patient with levothyroxine (0.01%).

From a total of 1191 patients, 880 (73.9%) patients had blurred vision and 80 (6.7%) patients complained of having floaters. Other presenting symptoms include black spots in the visual field, seeing flashes of light, sudden loss of vision, distorted vision, and night blindness which can arise alone or coexist with other symptoms.

Most patients came to the hospital after 2 weeks-6 months since the onset of the symptoms (450 cases; 37.8%). Shorter periods (less than 2 weeks) were found in 15.9% of cases. According to Table 2, nearly half of the patients were blind with the ratio of unilateral: bilateral blindness = 2.72:1. The mean intraocular pressure was 12.5 mmHg for the right eye, and 12.8 mmHg for the left eye. The most frequent laboratory and diagnostic tests requested by the VR department were blood sugar checks, followed by macular OCT, ultrasound B scan, fundus photography, and ONH OCT respectively.

In this study, we found different types of VR diseases over 1 year (table 3), in which diabetic retinopathy was the most common diagnosis (24.3%), followed by Rhegmatogenous Retinal Detachment (14.2%), and Pathological Myopia (8.1%). As it was shown on the table 3 that diabetic retinopathy affected both eyes of 257 patients (88.6%), while Rhegmatogenous Retinal Detachment most commonly affected one eye (164 patients, 95%). Amount of 106 patients (8.1%) of vitreous opacity cases appeared bilaterally.

From 290 cases of diabetic retinopathy, 173 (59.7%) cases were proliferative diabetic retinopathy and 117 (40.3%) cases were non-proliferative diabetic retinopathy. Out of 290 diabetic retinopathy cases, there are 111 (38.3%) cases of Diabetic Macular Edema with 67 (60.4%) cases affected both eyes and 34 (30,6%) cases affected only one eye. The result of this study also showed 38.2% of patients with VR diseases had concomitant cataract either in one or both eyes.

Table 2**. Baseline data of Visual Acuity based on ICD 10**

| Visual Acuity | N (Total = 1191) | Percent (%) |
|---|---|---|
| Mild | 242 | 20.3% |
| Moderate | 278 | 23.3% |
| Severe | 118 | 118% |
| Blindness | 553 | 46.4% |

Table 3. **VR Diagnosis and Affected Eye**

| Diagnosis | Unilateral | Bilateral | N person (%) |
|---|---|---|---|
| Diabetic retinopathy | 33 | 257 | 290 (24.3) |
| Rhegmatogenous retinal detachment | 164 | 5 | 169 (14.2) |
| Pathological myopia | 10 | 96 | 106 (8.1) |
| Posterior vitreous detachment | 56 | 41 | 97 (8.1) |
| AMD | 64 | 31 | 95 (8.0) |
| Vitreous opacity | 61 | 25 | 86 (7.2) |
| Peripheral retinal degeneration | 20 | 21 | 41 (3.4) |
| Vitreous hemorrhage | 33 | 0 | 33 (2.8) |
| Macular hole | 30 | 1 | 31 (2.6) |
| Retinal hemorrhage | 23 | 2 | 25 (2.1) |
| Central serous chorioretinopathy | 20 | 4 | 24 (2.0) |
| CRVO | 24 | 0 | 24 (2.0) |
| Retinitis pigmentosa | 1 | 22 | 23 (2.0) |
| Hypertensive retinopathy | 8 | 13 | 21 (1.8) |
| Epiretinal membrane | 13 | 5 | 18 (1.5) |
| Chorioretinal scar | 12 | 5 | 17 (1.4) |
| BRVO | 16 | 0 | 16 (1.3) |
| Myopic CNV | 9 | 7 | 16 (1.3) |
| Cystoid macular edema | 5 | 2 | 7 (0.6) |
| Exudative retinal detachment | 6 | 1 | 7 (0.6) |
| Proliferative vitreoretinopathy | 5 | 1 | 6 (0.5) |
| Retinal break | 5 | 0 | 5 (0.4) |
| Pigment epithelial detachment | 5 | 0 | 5 (0.4) |
| Vitreomacular traction | 5 | 0 | 5 (0.4) |
| Tractional retinal detachment | 3 | 1 | 4 (0.3) |
| CRAO | 4 | 0 | 4 (0.3) |
| Macular edema due to another cause | 2 | 1 | 3 (0.3) |
| Chorioretinitis | 2 | 1 | 3 (0.3) |
| BRAO | 2 | 0 | 2 (0.2) |
| Retinal vasculitis | 1 | 1 | 2 (0.2) |
| Choroidal melanoma | 1 | 0 | 1 (0.1) |
| Coats' disease | 1 | 0 | 1 (0.1) |
| Lupus retinopathy | 1 | 0 | 1 (0.1) |
| PHPV | 0 | 1 | 1 (0.1) |
| Retinitis | 1 | 0 | 1 (0.1) |
| Stargardt disease | 1 | 0 | 1 (0.1) |
| Total | 654 | 537 | 1191 (100) |

Table 4. **Diabetic Retinopathy Types**

| DR type | N (Total = 290) | Percent (%) |
|---|---|---|
| PDR | 173 | 59.7 |
| NPDR | 117 | 40.3 |

Among 1191 cases, vitrectomy was the most frequent intervention done by VR department, which was done in 258 cases (21.7%), followed by injection of anti-Vascular Endothelial Growth Factor which was done in 189 cases (15,9%), barrage laser in 144 cases (12.1%), Pan Retinal Photocoagulation in 97 cases (8.1%), silicon oil evacuation in 62 cases (5.2%), pneumatic in 16 cases (1.3%), macular grid laser in 4 cases (0.3%) and the least was hyaloidotomy which was done in only 2 cases (0.2%). Cases that still needed follow-up to VR department Bali Mandara Eye Hospital were 1.4 times higher (59.1%) than cases who had completed the treatment (40.9%).

## DISCUSSION

The increase of VR diseases cases, as the most frequent disease in Bali Mandara Eye Hospital in January 2020, intrigued us to conduct this study as we are eager to know the pattern and distribution of VR diseases in a larger number of participants.[10] Global estimate and report from RISKESDAS 2018 about the increase of diabetic patients is in concordance with our study result which showed that diabetes mellitus was the most common systemic factor found in patients with VR diseases.[2,6,7,8] More than a half of total patients visited VR department were new patients. Our study classified 36 types of VR diseases in 2019. Male patients were higher than female patients, some similar studies conducted in Subsaharan, Africa and Nigeria also reported the same result. These studies mentioned that the underlying reason may be contributed by social norms which restricted women to access health facilities.[11,12] Patients aged between 45 and 65 years old was the most common age group found in this group. The result was similar to other studies in Karachi and Nigeria. It was reported that VR diseases were mostly observed in this age group.[12,13]

In this study, we found that 94% of study participants received formal education, in which most participants were senior high school graduates. From a total of 1191 subjects, over 826 patients (69.4%) were still actively working. Majority of subjects were employees, either civil servants or general employees (422 patients; 35.4%), while 365 (30.6%) subjects did not work, including housewives, students and pensionary.

Systemic comorbids were found in 554 participants (46.5%). The most commonly found systemic disease was type 2 DM in 185 cases (15.5%), combination of DM and hypertension in 167 cases (14%) and hypertension in 154 cases (12.9%). The same pattern was observed in sub-Saharan and Karachi studies.[11,13] However, another study in Tehran reported that hypertension was the systemic comorbid most commonly found (21.14%), followed by diabetes mellitus (15.99%).[14]

Most of the cases (37.8%) had symptoms for approximately 2 weeks – 6 months before visiting the hospital, this may be due to distance from health care facilities, referral system, slow symptoms progression and also patient's own rejection to seek treatment.[16] Majority of patients in our study came with blindness (46.4%), which most commonly affected one eye (42.4%). However, this result might be affected by cataract that accompanied in 38.2% of cases, other than the retinal disease itself.

Diabetic retinopathy was the diagnosis with the highest incidence found in this study this study (24.3%), this finding is parallel to the increase of diabetic cases nationally.

Diabetic retinopathy was also the most commonly reported VR diseases of Hospital Based Studies as in Karachi studies.[13] However, the result of this study was different from a study in Nepal, in which age macular degeneration (AMD) was mostly diagnosed followed by diabetic retinopathy.[15] According to table 3, bilateral diabetic retinopathy cases were higher that unilateral involvement, similar to study reported in Karachi.[13]

Among all 290 cases of new diabetic retinopathy patients, proliferative diabetic retinopathy was the type that most commonly found (59.7%). In the study done in Nepal, the non-proliferative type was mostly diagnosed in new patients with equal distribution in the left and right eye.[16]

In our study, AMD contributed around 95 cases (8.0%) and was the fifth most commonly found from other 36 types of VR diseases. Our study also reported that in patients who came with initial presentation, AMD commonly affected one eye (61.6%). A study from Rai BB in Nepal found that unilateral involvement of AMD in the initial stage would slowly progress to bilateral cases. Unilateral involvement was more common than bilateral AMD in early presentation.[16]

Aside from diabetic retinopathy, another vascular disease that was commonly found was CRVO (2.0%), followed by hypertensive retinopathy (1.8%), BRVO (1.3%), CRAO (0.3%) and BRAO (0.2%). This pattern is similar to study in Germany and Nepal, CRVO incidence was found higher that BRVO and CRAO was more common than BRAO.[17,18,19]

Rhegmatogenous retinal detachment diagnosed in 169 patients (14.2%) from a total of 1191 cases with VR diseases. It was the second most common diagnosis reported in this study. We found 164 (97.0%) cases had unilateral involvement. This result is in accordance with a study conducted in India and Pakistan, in which bilateral involvement was lower with percentage of 13.5% (51 cases) and 2.8% (3 cases) respectively.[20,21] Our study result was also similar to the theory stated that rhegmatogenous retinal detachment was more commonly found than tractional retinal detachment (4.3%) and exudative retinal detachment (0.4%). Several studies mentioned that the increase of the incidence of rhegmatogenous retinal detachment is correlated with higher incidence of high myopia, peripheral degeneration, cataract surgery, trauma and rhegmatogenous disease in contralateral eye.[22] In East Asia, pathological myopia cases in college students contributed around 80 – 90% of rhegmatogenous retinal detachment.[16,23]

The research method of this study was retrospective descriptive study, thus the data was obtained from medical records. Multicenter analytic prospective cohort study is considered the more appropriate research method to generalize study result in population and analyze the correlation between variables. However, this study can still provide insight regarding the characteristic of VR diseases in Bali Mandara Eye Hospital. The classification of diabetic retinopathy according to WESDR and ETDRS was not presented in this study because the diagnosis was not evenly distributed. Data of BCVA may be influenced by disease other than retinal origin, including cataract thus, to minimize bias the proportion of cataract was presented in this study.

## CONCLUSION

Diabetic retinopathy and rhegmatogenous retinal detachment were the most common diagnosis found in this study. Strategic management must be implemented to lower the incidence including screening programs and early detection by identifying risk factors. Due to higher incidence of blindness in patients with VR diseases, reducing the number of these cases may have an impact to reduce blindness. High incidence of hypertension and diabetes mellitus found in this study is in accordance with an increase of hypertension and diabetes cases according to a report from Riskesdas. Joint care with other departments like internal medicine and clinical pathology may be needed to formulate proper screening and management strategy.

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