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Epidemiological Aspects of Diabetic Retinopathy at the Center of the Application of the Diploma of Specialised Studies in Ophthalmology (Cadeso)/Donka-Conakry

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Abstract

Purpose: The authors analyzed the epidemiological and clinical aspects of diabetic retinopathy at the Center for the Application of the Specialized Studies Diploma in Ophthalmology, Gamal Abdel Nasser University (CHU/Donka) Conakry. Diabetic retinopathy (eye damage: eye and retina) is a serious complication of diabetes that affects 50% of type 2 diabetic patients. The eyes are particularly sensitive to damage to a small vessel. Diabetic retinopathy (DR) is the retinal localization of diabetic micro angiopathy resulting in impaired blood flow in the affected territories, the consequences of which will determine the clinical manifestations of the disease. DR is the leading cause of vision loss in adults of working age. **Patients and Methods:** This is a longitudinal prospective study carried out at CADES/O concerning 198 diabetic patients. The selection criteria were that the media be transparent and the fundus accessible over a period of six months from February to July 2018. **Results:** A total of 73 patients (37%) presented with diabetic retinopathy with an average age of 49.5 +/− 9 years. The sex ratio (M/F) was 0.6 with a female predominance of 59%. Liberal profession patients were the most numerous 47.5%. Type 2 diabetes was the most common (85.86%). Diabetes fundus assessment was the most common reason for consultation (52%). Arterial hypertension was the most incriminated risk factor (45.45%) followed by the poor balance of diabetes (40.90%), and the age of diabetes (28.28%). 9.5% had diabetic retinopathy complicated by rubella iris, neovascular glaucoma and retinal detachment. **Conclusion:** Diabetic retinopathy is a common condition

for which early detection and regular monitoring must be the rule to prevent, slow down or avoids irreversible blindness if possible, induced by this pathology by a good balance of diabetes and good control of associated risk factors.

Keywords

Diabetic Retinopathy, Epidemiology, Center for the Application of the Specialized Studies Diploma in Ophthalmology (CADES/O)

1. Introduction

Diabetic retinopathy (DR) is the retinal localization of diabetic micro angiopathy resulting in impaired blood flow in the affected territories, the consequences of which will determine the clinical manifestations of the disease.

DR is the leading cause of vision loss in adults of working age. Approximately one in three people with diabetes have some degree of DR and one in ten will develop a vision-threatening form of the disease. The International Association for the Prevention of Blindness (IAPB) estimates that 145 million people had some form of DR and 45 million had vision-threatening DR in 2015. The prevalence of different forms of retinopathy in people with diabetes is 35%, and the prevalence of proliferative (vision-threatening) retinopathy is 7% [1].

It is the leading cause of blindness in industrialized countries before the age of 50 [2].

It is estimated that after 15 years of diabetes, 2% of diabetic patients become blind and 10% are visually impaired [2].

Diabetic retinopathy is the most formidable of the ocular complications of diabetes because of the functional prognosis that it can put at risk. It is difficult to treat and is unsuccessful at a certain stage of development despite therapeutic advances, hence the importance of early detection [3]. Apart from the treatment of aggravating factors (hypertension, glycemic imbalance, dyslipidemia), there is no effective medical treatment. Laser photo coagulation remains the reference treatment [3]. It is a preventable disease if a healthy lifestyle is followed and blood sugar checks are systematically carried out.

To date, no study has been carried out on DR in the Republic of Guinea; however, those carried out in Mali, Cameroon and Senegal indicate a prevalence of between 20% and 40% in the literature [2] [3] [4]. In view of the absence of data related to this dreaded condition in the long term in the Republic of Guinea, we set ourselves the objective through this study to determine the epidemiological and clinical aspects of diabetic retinopathy in a diabetic population at the Center for the application of the specialized studies diploma in ophthalmology (CADES/O) in Conakry, in order to determine the overall frequency of diabetic retinopathy, to determine the frequency according to the type of diabetes, to determine the influence of the risk factors of DR, to determine the different

stages encountered during diabetic retinopathy in our population and finally to evaluate the impact of diabetic retinopathy on visual acuity.

2. Materials and Methods

This is a prospective longitudinal study over a 6-month period from 1 February 2018 to 31 July 2018 inclusive.

We conducted a comprehensive recruitment process after informed consent during the study period.

Any known or newly discovered diabetic patient with an accessible fundus during the study period, who consulted the Ophthalmology Department of the center for the application of the specialized studies diploma in ophthalmology were recruited during the study period, whether or not they were followed up in the Internal Medicine Department. All included patients underwent a complete ophthalmological examination with retinal images, some of which illustrate a few cases from our study series and are presented in the figure (Figure 1).

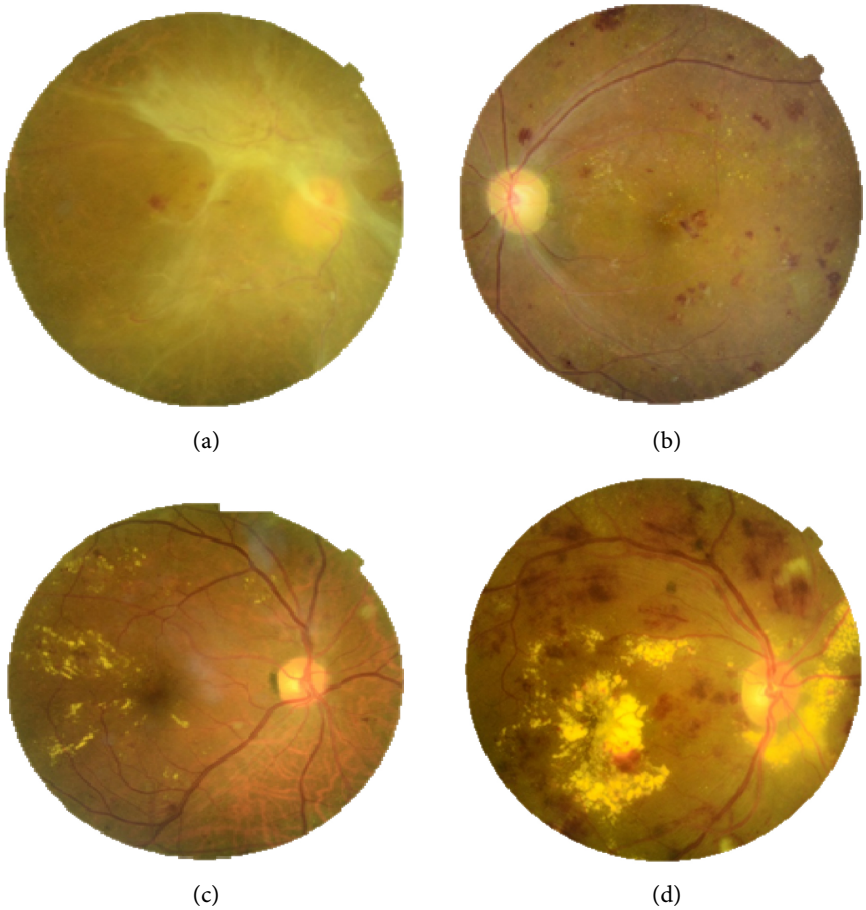

Figure 1. Fibrovascular proliferation in the right eye of one of the diabetic patients in the study population (a); Moderate non-proliferative diabetic retinopathy of the left eye (b); Minimal non-proliferative diabetic retinopathy associated with moderate oedematous-maculopathy OD (c); Severe non-proliferative diabetic retinopathy associated with diabetic maculopathy of the right eye (d).

The American Academy of Ophthalmology classification (**AAO 2003**) in the staging of diabetic retinopathy was the one used to describe the clinic of diabetic retinopathy after fundus examination and the biological assessment including the determination of the glycated hemoglobin level, the determination of blood lipids and the 24-hour micro albuminuria.

The parameters studied were those related to the patient (age, sex, history of hypertension) and those related to diabetes (type of diabetes, length of diabetes, glycemic imbalance and 24-hour micro albuminuria)

Patients with environmental disorders, all patients who did not give informed consent and those who did not complete the parameters determining the control or not of diabetes were not included in our study. The questionnaires were entered into EPI-INFO software version 3.5.3. The significance level of 5% was retained.

3. Results

3.1. Socio-Demographic Characteristics of Patients

Our study included a total sample of 198 patients ranging in age from 20 to 80 years with an average age of 49.5 years.

The female gender was the most represented 59% with a proportion of 0.6.

Patients not attending school (57%) represented the majority of our sample.

Self-employed patients (47%) were the most dominant in our sample followed by housewives who represented (28.3%) of the sample.

The majority of our patients lived in Conakry (73.7%).

82.2% of our sample were married (Table 1).

3.2. Clinical Characteristics of Patients

In our sample, the most represented risk factor was arterial hypertension 45.45% (n = 198) followed by poor diabetes control (40.90%).

The majority of patients 52% (n = 198) consulted for a check-up and the circumstances of the discovery of diabetic retinopathy during a check-up were 44% (n = 73), followed by a drop in visual acuity 34% (n = 73) with a delay of more than one year for consultation which was 43% (n = 198), followed by after confirmation of diabetes in our patients examined.

The majority of our patients had good visual acuity (49%), with almost half of our sample having good visual acuity.

Diabetic retinopathy was present in 37% of our target population with a predominance of moderate non-proliferative diabetic retinopathy 43.9% (n = 73).

The complications encountered in our sample were retinal detachment 57.2%, which was the most common type of complication, followed by neovascular glaucoma 28.6% and iridialrubiosis 14.2% (n = 7). Other causes of visual impairment in our target population include cataract (71.8); chronic glaucoma (14.3%); ametropia (10.7%); age-related macular degeneration (1.8%); Stargadt's disease and myelin fibers respectively (0.7%) (Table 2).

Table 1. Socio-demographic characteristics of diabetic patients seen at CADESO in Conakry, Guinea, 2018.

Variables	Workforce	Percentage
Age		
20 - 39	21	10.6
40 - 59	89	45.0
60 - 79	82	41.4
≥80	06	3.0
Gender		
Male	81	41
Female	117	59
Level of education		
Schoolchildren	85	43
Not in school	113	57
Profession		
Civil servant	41	20.7
Housewife	56	28.3
Self employed	94	47.5
Retirees	07	3.5
Source		
Conakry	146	73.7
LowerGuinea	23	11.7
AverageGuinea	12	6.0
UpperGuinea	09	4.6
Guinea Forester	06	3.0
Foreigner	02	1.0
Marital status		
Married	164	82.2
Divorced	04	2.0
Widower	28	14.1
Single	02	1.0

Table 2. Clinical characteristics of diabetic patients seen at CADESO in Conakry, Guinea, 2018.

Variables	Workforce	Percentage
Risk factors		
High blood pressure	90	45.45
Poor diabetes control	81	40.90
Cataract surgery	12	6.06

Continued

Proteinuria	11	5.56
Type of diabete	28	14.14
Duration of diabete	56	28.28
Pregnancy	**04**	**2.02**
Puberty	01	0.50
Dyslipidemia	50	25.25
Reason for consultation		
Impact assessment	103	52
Decreasedvisualacuity	35	17.7
Visual blur	27	13.7
Pruritus	06	3.0
Redness	02	1.0
Eye pain	09	4.6
Wateryeyes	04	2.0
Photophobia	02	1.0
Diplopia	01	0.5
Routine consultation	06	3.0
Other	03	1.5
Consultation time after diagnosis of diabetes		
Discovering	36	18
<1 year	77	39
>1 year	85	43
Circumstances of discovery of the diabetic retinopathy		
Fortuitous	03	4
Impact assessment	32	44
Decreasedvisualacuity	25	34
Complication of DR	03	4
Other	10	14
Visual acuity		
Good	97	49
Visual Impared	89	45
Blindness	12	6
Existence of diabetic retinopathy (n = 198)		
Yes	73	37
No	125	63

Continued

Types/stages of DR (n = 73)		
Minimum RDNP	18	24.7
Moderate RDNP	32	43.9
Severe RDNP	06	8.2
Proliferative RD	17	23
Complications of Diabetic Retinopathy (n = 7)		
Neovasculargla ucoma	02	28.6
Irian rubella	01	14.2
Retinaldetachment	04	57.2
Causes of visual impairment in diabetics (n = 160)		
Glaucoma	23	14.3
Cataract	115	71.8
Age-relatedmaculardegeneration	03	1.8
Stargadtdisease	01	0.7
Ametropia	17	10.7
Myelin fibres	01	0.7

Table 2 presents the risk factors, the reasons for consultation, and the consultation time after the diagnosis of diabetes as well as the circumstances of the discovery of diabetic retinopathy, the quality of vision, the existence or absence of retinopathy. Diabetic, the type of diabetes, the stage of diabetic retinopathy according to the classification of the American Academy of Ophthalmology of 2003, the complications of diabetic retinopathy and finally the causes of low vision of these diabetics besides diabetic retinopathy and its complications.

It is in fact, all the clinical variables that we have grouped together in a table.

It should be noted that arterial hypertension was the most common risk factor encountered in our study population of diabetics at 45.45%, followed by a poor balance of diabetes; As for a reason for consultation, the assessment of the impact of diabetes on the eyes was the main reason for consultation at 52% after a period of more than one year from the date of discovery of diabetes.

The patients had good visual acuity for the most part with a moderate stage of diabetic retinopathy which was the most frequent at 43.9%.

The feared complications were retinal detachment for a number 5, 47% of cases equal to (n = 73) at the complicated proliferative diabetic retinopathy stage. Other causes found in these diabetics responsible for the decrease in visual acuity other than the complications of diabetic retinopathy were especially cataracts at 71.86% for a number of patients (n = 198) diabetics.

In our sample, the most common type of diabetes was type 2 diabetes (86%) (Figure 2).

Diabetic retinopathy was associated with diabetic maculopathy in 48% (n = 73) and (Figure 3).

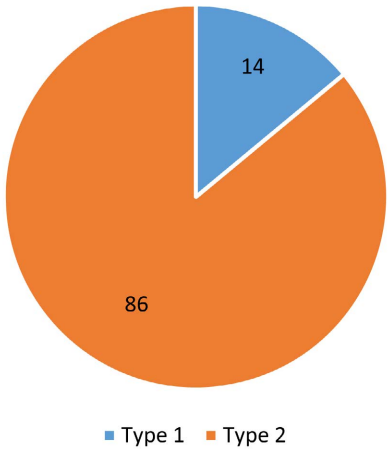

Figure 2. Frequency of diabetes according to the type of diabetes in our study, type 2 diabetes was by far the most common at 86% (n = 198).

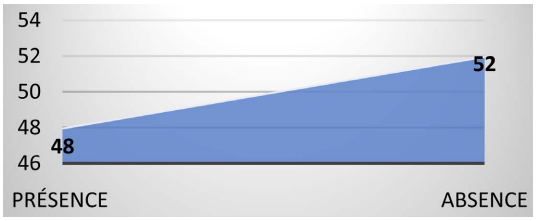

Figure 3. Distribution of diabetic retinopathy according to the presence or absence of diabetic maculopathy (n = 73). In our study, 37% (n = 198) of our patients with diabetic retinopathy had associated diabetic maculopathy with 48% (n = 35).

4. Discussions

Diabetic retinopathy is one of the most serious complications of diabetes.

Our study covered a period of six months; it was prospective and longitudinal from February to July 2018.

It has concerned 198 diabetic patients, of whom 73 (36.9%) had diabetic retinopathy.

4.1. Socio-Demographic and Clinical Characteristics

Diabetes occurs at all ages, depending on the type and associated risk factors. In our study, the frequency of diabetes increased proportionally with age with a peak around the age of 60 with an average of 49.5 with extremes of age between 20 and over 80 years; furthermore, the frequency of diabetes increases with age and the length of time the patient has had diabetes [5] [6] [7] [8].

There are an estimated 326.5 million people of working age (20 - 64 years) living with diabetes, and 122.8 million people aged 65 - 99 years have diabetic retinopathy. The number of people of working age with diabetes will increase to 253.4 million in 2045 [1]; the frequency of diabetic retinopathy increases with age and the age of diabetes such as in our study with a maximum of over 40 years; this would be explained by the slow progression of diabetic retinopathy and these results evolving with age; which is consistent with those of many Afri-

can studies in Benin, Cameroon, Morocco [4] [9] [10].

The majority of our diabetic patients were not educated (56.6%). The variable educational level has been studied very little in the literature. However, diabetic retinopathy is significantly more frequent in the uneducated. This could be explained by the influence of the level of education on the facilitation of therapeutic education as reported by **ABOUKI and col** [3].

The identification of risk factors allows us to envisage multidisciplinary actions aimed at preventing complications and detecting them early; arterial hypertension was found in (45.45%) in our series, followed by poor diabetic control (40.90%) as well as the age of the diabetic (28.28%), which were the main risk factors for diabetic retinopathy in our patients; This is close to the data in the literature of some authors considering the blood pressure level as a risk factor; in **ABOUKI**, 88 diabetics patients had high blood pressure, 67 patients had a history of arterial hypertension before the discovery of diabetes of which among them, 22 diabetics, that is 32.84%, presented diabetic retinopathy, the imbalance of diabetes was observed in 54.76%, which is supposable with our study [4] [10].

The patients in our series of studies had as their main reason for consultation, the impact report of diabetes in eyes which was a means of discovering diabetic retinopathy in (44% n = 32) which enabled us to understand good communication between Guinean internists and endocrinologists in the multidisciplinary management of diabetes; More than half of the patients in our series checked for an assessment of the repercussions of diabetes 52%; the delay of specialized consultation of our patients was longer than one year after the detection of their diabetes; This delay and the rather long duration of ophthalmological check can be explained by the delay in the onset of ocular complications of diabetes which can affect the quality of vision after several years of diabetes evolution as well as the lack of understanding of the interest of an early multidisciplinary screening given that; This is why we noticed that the number of patients who consulted us for reduced visual acuity in the context of diabetes was around 34%, which is much lower than the discovery of diabetic retinopathy during an assessment of the impact; as we do not know the actual onset of diabetes, an early check from the time of diagnosis would be desirable for early detection of diabetic retinopathy, which is strongly influenced by the duration of diabetes and other risk factors mentioned above, knowing that complications could be present from the first ophthalmological screening consultation after a recent discovery of diabetes.

During diabetes, diabetic retinopathy is one of the most frequent degenerative complications; moderate non-proliferative diabetic retinopathy was by far the most common at the fundus, 16.2% (n = 32) diabetics, thus explaining the slow and progressive evolution of the disease by good quality of follow-up in our patients.

It is estimated that 30% to 40% of diabetic patients have retinopathy [2] [11]. Our results appear to be consistent with studies by African and European authors [6] [7] [12] [13].

Our results appear lower than those of other African authors: ABOUKI 43.33% in 2016 in Porto Novo [4], KOKI in Cameroon **(42%)** [6], AYNAOU, *et al.* 41% in Morocco in 2015 [9] but very close to DJROLO [14] in 2014 at Cotonou who found 36.6% and AYED in Tunisia **(37.5%)** [15].

Retinal detachment was the most common form of complicated diabetic retinopathy in our study and affected (n = 4) of our patients. This was due to negligent monitoring and poor self-management of diabetes, which is one of the main risk factors for the progression of the condition.

In our series, type 2 diabetes or non-insulin-dependent diabetes mellitus (NIDDM) was the most frequent compared to type 1 diabetes or insulin-dependent diabetes mellitus (IDDM) with respective frequencies of 85.86% and 14.14% of the cases in our series (**Figure 2**), which is in agreement with the data in the literature of some authors [4] [6] [7] [8] [9] [10] [16].

4.2. Impact of Diabetic Retinopathy on Visual Acuity

According to the National Vision 2020 Plan, among all causes of blindness and vision loss combined. The causes are classified as follows: cataract (50% of blindness cases), glaucoma (15% of cases), onchocerciasis (10% of cases), refractive errors (10% of cases), childhood blindness (5% of cases), diabetic retinopathy (1%) and other causes of blindness (9% of cases) (11) This is similar to the causes of reduced visual acuity in our diabetics in the presence or absence of diabetic retinopathy, of which cataracts account for 58.08%. This high rate can be explained by the duration of diabetes and the severity of hyperglycemia.

5. Conclusions

Diabetes is a global problem that kills and disables, affecting people in their later years.

The most productive impoverish families or reduce the life expectancy of older people

This public health problem because of the prevalence of diabetic retinopathy, which is one of its potentially formidable complications and the leading cause of vascular blindness before the age of fifty, was found in 36.9% of our patients and this frequency would increase with age as well as the duration of diabetes and the combination of other risk factors.

Maintaining good blood sugar and blood pressure control and optimal self-management remains the keystone of the management of diabetic retinopathy.

Systematic early detection and regular monitoring are necessary to prevent its complications, which cause visual impairment.

The aim of our study was to determine the epidemiological and clinical aspects of diabetic retinopathy (all forms) in our specialized diploma center and to compare it with non-Western and Western studies.

With estimates in Africa of 21.5 million macular edema cases to be treated and 430,000 visually impaired or blind people to be prevented by 2025, early de-

tection and a prospect of assessing the prevalence of diabetic macular edema in Guinea would be a good approach.

Limits of the Study

Our limitations and difficulties were the lack of previous studies on the subject and of optical coherence tomography (OCT) in Guinea, the difficulty of performing the fundus for certain diabetics, the unavailability of the glycated hemoglobin level in certain files and the impatience of certain patients due to the slowness of pupillary dilation because of their altered general state.

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Conflicts of Interest

The authors declare that they have no conflicts of interest in relation to this article.

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Appendix

Survey sheet Retinopathy Diabetic

Epidemiological and clinical aspects of Diabetic at CADES/O from the 1st of February to 31st July 2018.

Fact Sheet N˚:

I. Identification

1) Patient name's and Surname

2) Gender: /...../ (male = M, female = F)

3) Age: /...../ (years)

4) Profession: /...../ (1 = civil servant, 2 = Housewife, 3 = Liberal, 4 = Retracted)

5) Marital status: /...../ 1 = married, 2 = divorced, 3 = widowed (Ve), 4 = single

6) Origin: /...../ (1 = Conakry, 2 = prefectures of the Lower Coast, 3 = prefectures of Middle Guinea, 4 = prefectures of Upper Guinea, 5 = prefectures of Guinea Forester, 6 = other countries)

7) Level of education: /...../ (1 = out of school, 2 = Schooled).

II. Diabetes Information

1) Age of diabetes: /...../ (1 = <10 years 2 = ≥10 years)

2) Circumstances of discovery of diabetes: /...../ 1 = fortuitous discovery, 2 = signs, 3 = complications, 4 = others (specify: .....)

3) Type of diabetes: /...../ (1 = type 1, 2 = type 2)

4) Treatment of diabetes: /...../ (1 = Diet, 2 = ADO, 3 = insulin, 4 = insulin +ADO)

5) Presence of HTA: /...../(o = yes n = no)

6) Diabetes Monitoring: /...../ (1 = Good 2 = Bad)

7) Pregnancy: /...../ (1 = Yes 2 = No)

8) Balance Diabetes: /...../ (1 = Yes 2 = No)

III. Anthropometry

1) Size: /...../ (cm)

2) Weight: /...../ (kg)

3) BMI: /...../

4) Obesity: /...../ (o = yes n = no)

IV. Ophthalmological Examination

1) First Ophthalmological examination: /...../ (o = yes, n = no)

2) Consultation deadlines: /...../ (1 = Discovery 2 = <1 years 3 = >1 years)

3) Visual acuity from afar

S/C OD: /...../ OG: /...../

A/C OD: /...../ OG: /...../

NB: **Good (1):** AV ≥ 3/10 **Visually impaired (2):** 1/10 ≤ **AV <** 3/10 **Blind (3):** AV < 1/50 à non PL

4) Close Visual acuity

S/C: /...../ A/C: /...../

5) Slit lamp examination:

Annexes:

OD: /.....

OG: /.....

Anterior segment:

OD: /.....

OG: /.....

IOP: OD/...../ OG/...../ (mm·hg)

Fundus: OD/...../ OG/...../ 1 = normal, 2 = micro retinal aneurysms, 3 = persistent hemorrhage (3a = punctiforms, 3b = spot), 4 = exudates, 5 = cottony nodules, 6 = extensive intraretinal hemorrhages, 7 = Intraretian microvascular abnormalities, 8 = Venous anomalies = rosary, 9 = Venous anomalies = loops, 10 = Macula = macular edema, 11 = Macula = circinciated exudates, 12 = Pre-retinal neo-vessels, 13 = Neoprepalpal vessels, 14 = Vitreous hemorrhages, 15 = retinal detachment, 16 = arteriolar narrowing, 17 = arteriovenous crossing, 18 = papillary edema, 19 = appearance of vessels (19a = silver, 19b = copper).

6) Additional examinations: /...../ 1 = Fasting blood glucose, 2 = Glycated hemoglobin, 3 = Serum lipids, 4 = AGF, 5 = others (specify: .....)

7) DR Classification (AAO): /...../1 = No RD, 2 = Minimal RDNP, 3 = Moderate NPRD, 4 = Severe NPRD, 5 = Early PDR, 6 = High-Risk PDR, 7 = Advanced PDR, 8 = Complicated PDR (8a = HIV, 8b = DDR, 8c = Iris Rubosis, 8d = NGV).

8) Classification of Diabetic macular edema: /...../ 1 = No macular edema, 2 = minimal macular edema, 3 = moderate macular edema, 4 = weaned macular edema, 5 = Ischemic maculopahia, 6 = Mixed maculopathy)

9) Other causes of visual impairment: /...../to be specified