PREVALENCE OF DIABETIC RETINOPATHY IN ASSOCIATION WITH ANEMIA

Varshini Erroju[1*], Sai Bindu Cholleti [1], Eesha Mateti[1] , Bhavani Ankamalla[1], Pabba Parmeshwar [1*], Chaitanya Konda[2]

1. Department of Pharmacy Practice, Jyothishmathi Institute of Pharmaceutical Sciences, Thimmapur, Karimnagar 505481,Telangana, India
2. Department of Endocrinology, Prathima Institute of Medical Sciences, Nagunoor, Telangana -505417,India.

Corresponding authors*: E Varshini, Pabba Parameshwar

ABSTRACT

Introduction: -Diabetic Retinopathy is the most terrible sight-threatening disorder characterized by retinal changes seen in Diabetic patients. Anemia is the most commonly occurring complication of Diabetes Mellitus and is considered as the independent risk factor for developing Diabetic retinopathy.

Objectives:- Main objective is to find the prevalence of Diabetic Retinopathy in association with anemia among Diabetic patients and how the presence of Anemia can affect the occurrence of Diabetic Retinopathy

Methods: -This is a cross-sectional observational study that was conducted for six months in 150 Diabetic patients and they were evaluated and monitored for the presence or absence of diabetic retinopathy in association with anemia.

Results: -Out of 150 Diabetic patients. 78 were with Diabetic retinopathy (DR) (41males & 37 females). Most of the patients with DR are of age group 56-65 years. Duration of DM also affects DR. Patients with a longer duration of DM >5yrs are more prone to develop DR than those<5years. Anaemia is a major risk factor of DR . Out of 78 DR patients, males with DR with anaemia are 31 and females are 28.

Keywords: Diabetes mellitus, Diabetic retinopathy, Anemia

INTRODUCTION

DIABETIC RETINOPATHY

Diabetic retinopathy (DR) is a vascular disorder of the retina which affects patients with diabetes mellitus. It is the primary cause of blindness in people between the ages of 25-70 years on the globe. Out of the millions of people with DR, almost one-fourth may have vision-threatening DR.[1,2]

Although the exact Pathophysiology of diabetic microvascular disease is unknown, hyperglycemia is thought to cause endothelial damage, selective loss of pericytes, and basal membrane layer thickening, all of which give way to incompetent, leaky blood vessels.[3]

Anemia and its correlation with Diabetes Mellitus

Diabetes may cause excess glucose in the blood, which leads to kidney damage, as kidneys are involved in blood filtration and also release erythropoietin (EPO) hormone (which sends signals to the bone marrow to produce more no. of RBCs) the damaged kidney doesn't produce erythropoietin, it results in the development of anemia.

Anemia is one of the most common under diagnosed complication of diabetic patients than in nondiabetic patients. Sometimes Anemia can falsely lead to low HbA1c levels, which result in under-diagnosis and treatment of hyperglycemia, which in turn contributes to macro and microvascular complications of diabetes.

CLASSIFICATION

Diabetic retinopathy has two main classes:

Non-Proliferative

Proliferative.

I. Non-Proliferative Diabetic Retinopathy (NPDR):

Hyperglycemia results in damage to retinal capillaries and consequences in small outpouchings of the vessel lumens called **Microaneurysms**. Microaneurysms eventually rupture to form hemorrhages deep within the retina, Because of their dot-like manifestation, they are called "**dot-blot**" **hemorrhages**.

The poor vessels become leaky, causing fluid to seep into the retina. Fluid deposition under the macular region causes **Macularedema**, this interferes with the macula's normal function and cause vision loss. Resolution of fluid lakes can depart back residue, which is composed of lipid byproducts and looked as waxy, yellow deposits called **Hardexudates**.

As NPDR progresses, the affected capillaries eventually become obstructed, this result in infarction of the nerve fiber layer, emerging in fluffy, white patches called **Cotton Wool Spots.**

II. Proliferative Diabetic Retinopathy (PDR):

PDR – Retinal cells respond to continues ischemia and releases angiogenic signals such as vascular endothelial growth factor (VEGF), which initiate the growth of new retinal blood vessels to bypass the injured vessels i.e. **Revascularization**. In PDR, the fibro vascular accumulation expands beyond the Internal limiting membrane (ILM). This may good idea, but the new vessels are fragile, leaky, and often misdirected. They may grow off the retina and into the vitreous. As with age, vitreous shrinks, it grabs on these weak vessels and can induce them to tear, emerging in a **vitreous hemorrhage** and sudden vision loss. These vessels may also scar down, creating tough anchors between the retina and vitreous, affecting friction on the retina. If sufficient force is generated, frictional retinal separation may occur. This is another means by which DR can affect unexpected vision loss. If the retina is not reattached soon, particularly if the macula is implicated, vision may be permanently endangered.

III. Diabetic maculopathy

Alterations in the macular region may be linked with non-proliferative diabetic retinopathy (NPDR) or proliferative diabetic retinopathy (PDR). Diabetic macular edema occurs due to increased permeability of the retinal capillaries [4]

IV. Advanced diabetic eye disease

It is the outcome of uncontrolled proliferative diabetic retinopathy, characterized by complications such as

- Persistent vitreous hemorrhage, Tractional retinal detachment and Neovascular glaucoma

SIGNS AND SYMPTOMS OF DIABETIC RETINOPATHY

Difficulty in reading, Blurring of vision, Sudden failure of vision in one eye, Seeing ring around lights, Dark spots or flashing light

Investigations

- Urine examination, Blood sugar estimation, 24-hour urinary protein, Renal function tests, Lipid profile, Haemogram, Glycosylated hemoglobin (HbA1C)
- Fundus fluorescein angiography could be carried to elucidate areas of neovascularization, leakage, and capillary none perfusion.

- Optical Coherence Tomography (OCT) to study detailed structural changes in Diabetic maculopathy. [5]

MANAGEMENT

I. Screening for Diabetic retinopathy.

- To prevent visual loss occurring from diabetic retinopathy a periodic follow-up is very important for a timely intervention.

II. Medical treatment -include

1. *Control of systemic riskfactors* like – Blood glucose, Anemia, Hypertension, Hypoproteinemia, Dyslipidemia.

2. *Pharmacological modulation* - Pharmacological inhibition of certain biochemical pathways involved in the pathogenesis of retinal changes in diabetes can be done by

- Anti-vascular endothelial growth factors (Anti-VEGF) (role is well established), Other factors role is still being evaluated include
- Protein kinase C (PKC) inhibitors are Aldose reductase and ACE inhibitors, and Antioxidants such as vitamin E

3. Intravitreal steroid in reducing diabetic macular edema is also being recommended by following modes of administration.

- Fluocinolone acetonide intravitreal implant, and
- Intravitreal injection of triamcinolone (2 to 4 mg)

III.Photocoagulation. It is the most commonly used treatment of diabetic retinopathy and maculopathy. Double frequency YAG laser 532 nm is preferred. The procedure of laser application is varied for macula and the rest of the retina is as follows:

i.Macular photocoagulation- macula is treated by laser only if there is clinically significant macular edema (CSME). Laser treatment is contraindicated in ischemic diabetic maculopathy. It include 2 techniques i.e. - Focal treatment, Grid treatment

ii. Panretinal photocoagulation (PRP) or *Scatter laser* consists of 1200-1600 spots, every 500 micrometers in size and 0.1-second duration. Laser burns are referred to outside the temporal arcades and on the nasal side of 1 disc diameter from the disc up to the equator. The burns should be one burn width apart. In PRP inferior quadrant of the retina is early clotted. PRP develops damage of the hypoxic retina which is dependable for the generation of vasoformative factors.

IV. Surgical treatment. It is suggested in progressive cases of PDR. Pars plana vitrectomy is suggested for dense lasting vitreous hemorrhage tractional retinal detachment and epiretinal membranes. Attributed retinal separation also needs surgical repair.

METHODOLOGY

This is a cross-sectional observational study conducted over six months in the PRATHIMA INSTITUTE OF MEDICAL SCIENCES. The patients who attended the ward in this six months duration with DIABETES MELLITUS was evaluated and monitored for the presence or absence of Diabetic retinopathy in association with anaemia. Using a suitable data collection form the following details were taken i.e. patient demographics, prescription data, culture test, lab data, discharge data, progress chart, doctors notes, and nurse notes.

Ethical Approval - The study protocol was prepared, submitted, and approved by the institutional ethics committee.

Study Design and Site - It is a Cross-sectional observational study conducted on the PREVALENCE OF DIABETIC RETINOPATHY IN ASSOCIATION WITH ANEMIA patients admitted and being treated in the Endocrinology and Ophthalmology Department in PRATHIMA INSTITUTE OF MEDICAL SCIENCES (PIMS), Nagunoor., Karimnagar. Study was conducted for 6 months from December 2020- May 21.

Sample Size - A total of 150 patients from various regions of Telangana have attended the inpatient and outpatients of the Endocrinology and Ophthalmology ward of PIMS hospital in 2020-2021 were taken in the study.

Study Criteria

Inclusion Criteria- Type –II Diabetes patients, Age above 35

Exclusion Criteria- Macrovascular complications**,** Age below 35**,**Type -1 Diabetic patient, Pregnant and Lactating woman, Paediatrics**,** HIV/AIDS

MATERIALS

- Priory-designed case report forms for the collection of patient data were prepared, presented, and annexed.

RESULTS AND DISCUSSION:

Total 150 cases were selected after exclusion criteria and the cases were segregated into groups where we were selected independent variables like Age, Gender, and dependent variables like

Diabetic retinopathy with or without anemia. We have made tables and graphs for all variables; Figure no.2 indicates the gender distribution in that we found that females are more prone to diabetic retinopathy when compared to males. Fig no. 3 indicates the age-wise distribution in that we found that age between 56-65 years and above was more affected with diabetic retinopathy and age between 35 to 45 are less affected. Figure no.4 indicates the distribution of subjects based on the duration of diabetes mellitus in that we found that patients with below 5 years of duration were less affected and above 5years are more affected. From the graph under Figure no.5 females are more prone to anemia than males. Figure no.6 shows distribution based on gender with diabetic retinopathy in association with anemia and without anemia shows both males and females are equally prone diabetic retinopathy with anemia compared to diabetic patients without anemia. Fig 7,8,9 shows significant after application of one-way ANOVA to our dependent variables

Table 2: Distribution of Subjects based on gender versus diabetics with Retinopathy and diabetics without Retinopathy.

Gender	Diabetic Retinopathy present	%of Diabetic Retinopathy present	Diabetic retinopathy absent	% of Diabetic retinopathy absent	Total no. of patients
Female	37	61%	24	39%	61
Male	41	46%	48	54%	89
Total	78	100%	72	100%	150

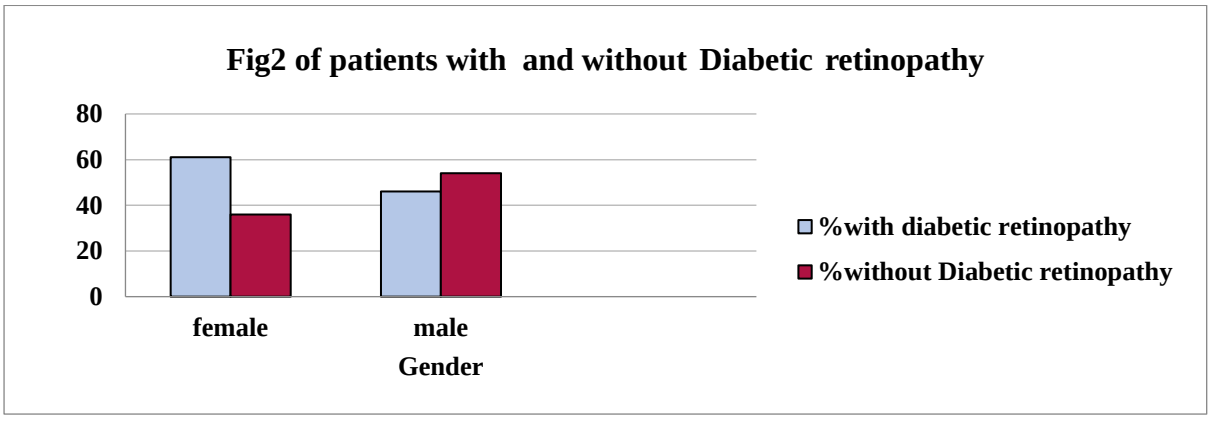


Table 3: Distribution of subjects by Age versus Diabetes with Retinopathy and Diabetes without Retinopathy

Age group	Diabetic retinopathy present	Diabetic retinopathy absent
35-45	7	22

46-55	20	24
56-65	28	17
65 above	23	09

Fig 3 Distribution of subjects based on Age

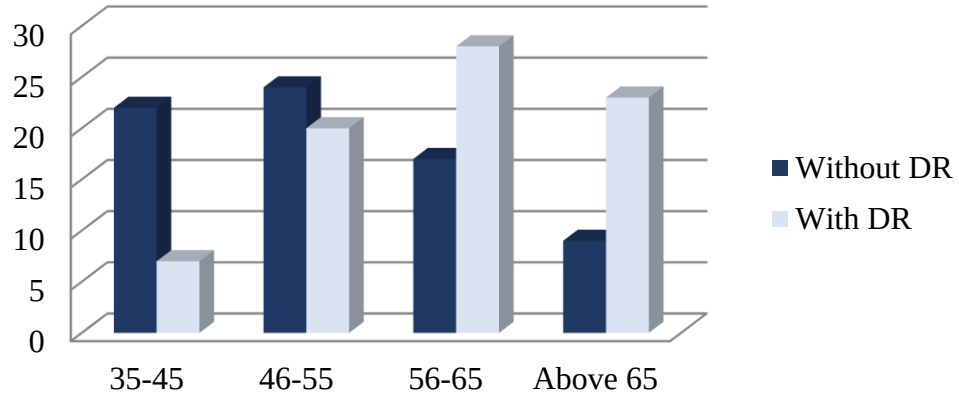


Table 4: Distribution of subjects based on the duration of Diabetic Mellitus and Diabetes with Retinopathy and Diabetes without Retinopathy

Duration of DM	Diabetic retinopathy present	Diabetic retinopathy absent
Below 5 years	18	48
Above 5 years	60	24

Fig 4 Distribution as per Duration of Diabetes Mellitus

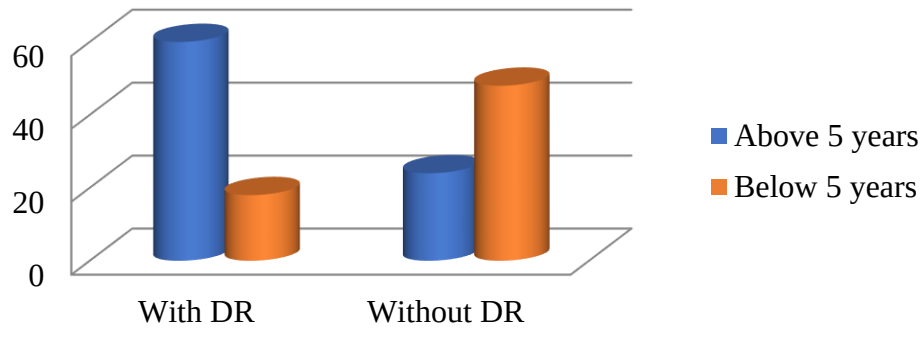


Table 5: Distribution of subjects based on gender versus anemia present and anemia absent

Gender	Anemia present	% with Anemia present	Anemia absent	% without Anemia	Total no. of patients

Female	36	59%	35	41%	61
Male	39	44%	50	56%	89

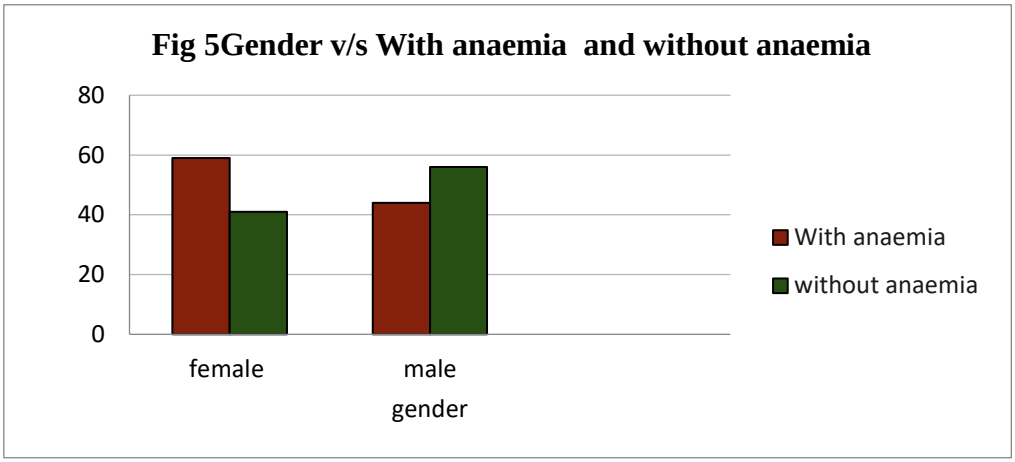


Table 6: Distribution of subjects based on Gender and Diabetic Retinopathy in the association of anemia and Diabetic Retinopathy without anemia

Gender * diabetic type –Cross tabulation					
			Diabetic type		Total
			Diabetic retinopathy without Anemia	Diabetic retinopathy With Anemia	
Gender	M	Number of Patients	10	31	41
		% of total	24%	76%	100%
	F	Number of Patients	9	28	37
		% of total	24%	76%	100%
	Total	Number of Patients	19	59	78
		% of total	24%	75%	100%

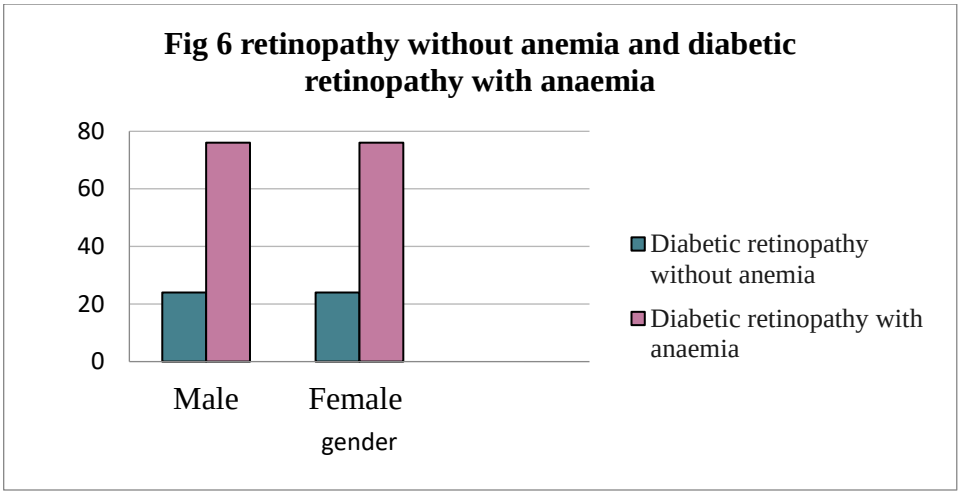
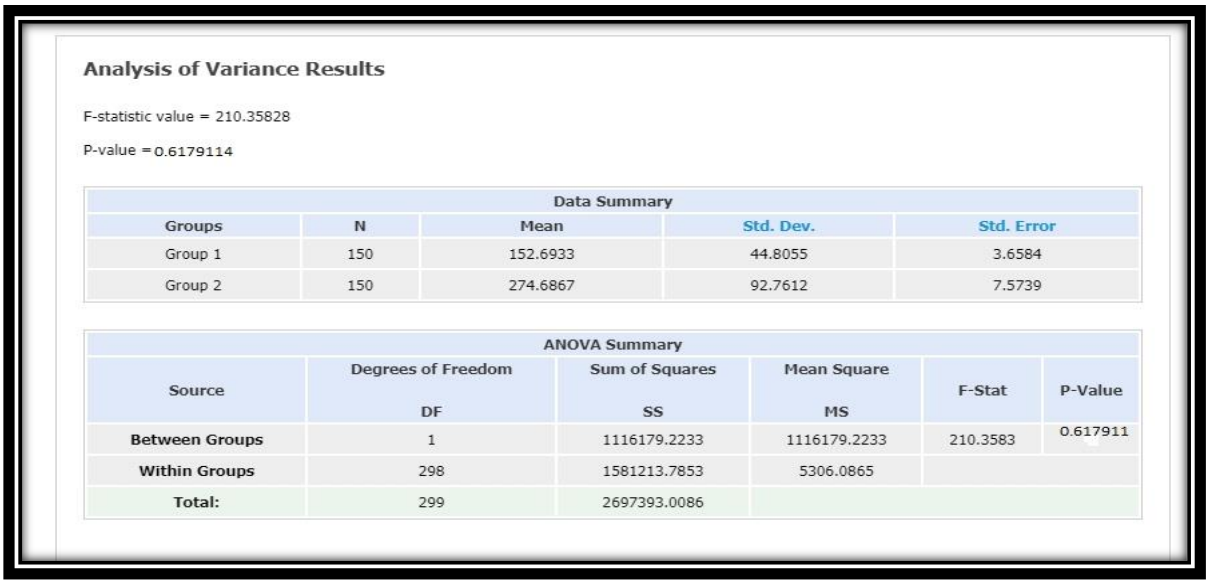


Fig 7 We were applied one–way ANOVA to our dependent variables it was observed as significant



Analysis of Variance Results

F-statistic value = 210.35828

P-value = 0.6179114

Data Summary

Groups	N	Mean	Std. Dev.	Std. Error
Group 1	150	152.6933	44.8055	3.6584
Group 2	150	274.6867	92.7612	7.5739

ANOVA Summary

Source	Degrees of Freedom DF	Sum of Squares SS	Mean Square MS	F-Stat	P-Value
Between Groups	1	1116179.2233	1116179.2233	210.3583	0.617911
Within Groups	298	1581213.7853	5306.0865		
Total:	299	2697393.0086			

Fig 8 Group 1 is FBS: Fasting blood sugar, Group 2 is RBS: Random blood sugar

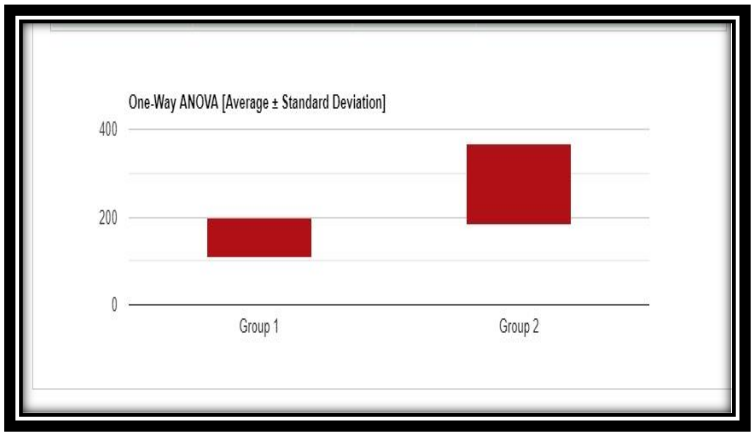
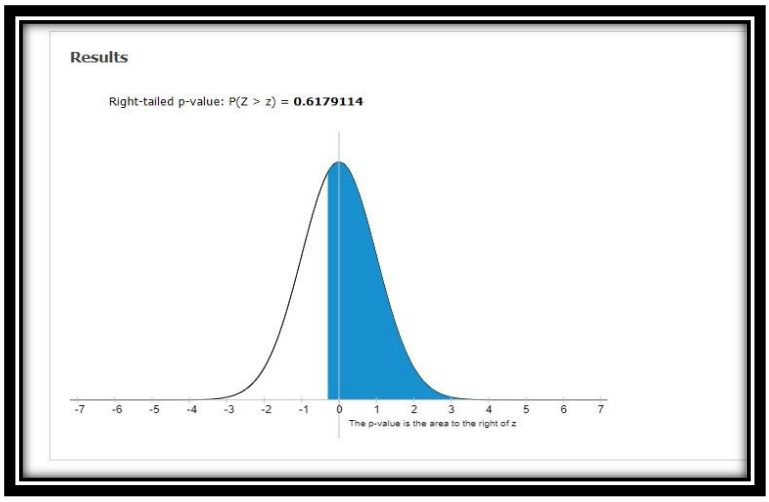


Fig 9 P-Value distribution



CONCLUSION:

Diabetic retinopathy is one of the preventable microvascular complications of diabetes mellitus affecting mainly the retina and causing vision loss. Uncontrolled blood sugar, sedentary lifestyle, and diet are the main risk factors for developing type 2 DM and untreated DM for more than 5years and patients above 50 years of age are at risk for developing diabetic retinopathy. Anemia is one of the major risk factors for developing diabetic retinopathy, therefore identifying and treating anemia in early stages can greatly impact in managing Diabetic retinopathy. Availability of the clinical pharmacist and providing services such as patient education regarding controlling blood glucose, identifying patients who are at risk of developing diabetic retinopathy with anemia in early stages will significantly reduce the prevalence of diabetic retinopathy in diabetic patients

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