

Delving into the Impact of Diabetic Retinopathy on Patients' Perceptions of Diabetes

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Abstract - Microvascular problems, like diabetic retinopathy (DR), can make it even harder for a person to understand what they have. People who have diabetes mellitus (DM) have a hard time with their lives, and DR can make it even harder for them to understand their disease. DR has an effect on how people with diabetes understand and make choices about their condition. The mental effects of diabetic retinopathy (DR), especially how vision loss can change how people feel about their overall health and their ability to stick to their treatment plans. It looks into the idea that DR might make people feel more worried, sad, and alone due to increased emotions. The problems that rheumatoid arthritis (DR) caused by diabetes makes it hard to do things that are necessary for controlling diabetes. These things that people with poor vision might find hard to do include checking blood sugar levels, giving medications, and making healthy meals. There is a gap between the mental effects of DR and the health problems that come with it of this size. It is possible for healthcare professionals to make more complete treatment plans that deal with both the physical and emotional aspects of the disease if they understand how DR changes the way people think.

Keywords – Diabetes Mellitus (DM) , Diabetic Retinopathy (DR) ,

I. INTRODUCTION

Sugar levels in the blood are usually very high in people with diabetes mellitus (DM), a metabolic problem that lasts for a long time. People who work in medicine call an upsurge in the amount of glucose in the blood "hyperglycemia." The main cause of this illness can be either less insulin production or insulin resistance. Type 1 and type 2 diabetes mellitus are the two kinds of diabetes that people get the most often [1]. An estimate from 2013 said that about 382 million people around the world had been identified with diabetes mellitus, with type 2 diabetes affecting about 90% of those people. These two numbers together make up 83% of the adult population [2]. When looking at countries in the region of the Middle East, Saudi Arabia has the second-highest rate of diabetes. It is also ranked seventh in the world [3]. Unfortunately, the rate is expected to rise even more because of a number of different causes, such as people not being active enough, the population getting older, and the rising rate of obesity in Saudi Arabia [4]. This is an endocrine disease that affects many organ systems, which is why it has a high rate of illness and death. One of these problems is microvascular diabetic retinopathy (DR) [5], which causes about 4.8% of all blindness cases in the world [6]. Diabetic retinopathy is a serious problem that can happen to people with diabetes. People who are old enough to work are thought to be most at risk for this problem, which can be stopped and causes vision loss [6]. A study called the Global Burden of Disease Study [7] found that diabetes mellitus is the seventh-most prevalent cause of blindness in people aged 50 and up. It is thought that about 34% of people with diabetes will get diabetic retinal degeneration (DR) at some point in their lives [8]. Diabetes-related retinopathy (DR) is very common in Saudi Arabia, as shown by the many pieces that have been written from different parts of the country. A rough guess is that 36% of people in the city of Al-Madinah have diabetes retinopathy. The number is also 33% in the Al-Ahsa region, showing that this is also the case there. The results of studies [9–11] showed that diabetic retinopathy (DR) developed in 27.8% of people in the southern area who were diagnosed with diabetes. People who have high blood sugar, a condition known as diabetes mellitus that has been established for a long time, or high blood pressure are more likely to get diabetic retinopathy and make it worse. This means that people can successfully prevent and slow the progression of diabetes by making sure that their glucose levels are somewhat properly and consistently controlled throughout their whole lives [12]. Raising understanding and correct information about this widespread illness could lead to better early detection and more effective treatment. A research investigation that looked at the link between the two found that patients who don't understand their disease and those who don't control their risk factors well are

significantly linked. Individuals who had received education and knew more than the average amount about their situation, on the other hand, had good attitudes and good patterns of behavior [13].

II. LITERATURE REVIEW

Aldahlawi et al. (2024) [14] talked about a study that looked at how aware diabetic patients were of diabetic retinopathy and its complications in the western part of Saudi Arabia. Getting started Hyperglycemia is a sign of diabetes mellitus (DM), a long-term metabolic disease. There are 382 million people with diabetes mellitus around the world, and 90% of them have type 2 diabetes. The number of people with diabetes in Saudi Arabia is the second highest in the Middle East. Diabetes can lead to retinopathy (DR), which is a serious problem that needs to be found early and treated correctly for the best outcome. Aim The goal of this study is to find out how much diabetic patients in the western part of Saudi Arabia know about the signs and complications of diabetic retinopathy. These were the methods used for this cross-sectional study. A convenience sampling method was used to get information from all diabetic patients at the National Guard Health Affairs in the western region between February 2022 and October 2022 who met the inclusion criteria. People with type 1 or type 2 diabetes who are at least 18 years old and have been to at least one outpatient ophthalmology office were included in the study. The Results 259 people took part in this study. The people who took part are, on average, 46.69 years old (SD = 15.59). There were 58.3% more applicants who were Type 2 than Type 1. 242 of the people who took the survey (93%) knew that diabetes could have an effect on their eyes. It's surprising that 130 people (50.2%) do not know about the different ways to treat diabetic retinopathy. This lack of information about diabetic retinopathy was the biggest reason why diabetic patients didn't get checked for eye diseases sooner. A significant statistical link was also found between the year of diagnosis and the amount of knowledge about eye problems.

In 2024, Pandya et al. [15] suggested Pan-Retinal Photocoagulation as a way to help people with proliferative diabetic retinopathy with their vision. This review covers all aspects of pan-retinal photocoagulation (PRP) as a key method for helping people with proliferative diabetic retinopathy (PDR) get their sight back. The first part of the review talks about what PDR is and how it fits into the spectrum of diabetic retinopathy (DR). It stresses how the disease gets worse over time and how that affects eye health. This section goes into great detail about PRP, including what it is, why it exists, and how it has changed over time. This helps to explain the complicated steps and how it works. The part on postoperative care and follow-up stresses how important it is to keep a close eye out for complications, make sure the vision gets better, and get regular eye exams. After that, patient education and counseling are talked about, with a focus on managing expectations, encouraging lifestyle changes, and stressing how important it is to keep follow-up visits. The review ends with some thoughts on where things might go in the future, such as improvements in laser technology and new treatments. These thoughts give us a look at how DR management is changing. This review is a complete guide for clinicians, researchers, and healthcare professionals who help people with PDR improve their vision. It does this by looking at current problems and new ways of doing things.

Błaszkiewicz et al. (2023) [16] talked about progress and new ideas in understanding how diabetic retinopathy works at the molecular level. Diabetes mellitus (DM) is becoming more common, and diabetic retinopathy (DR) is the most common consequence of it. Fundoscopic examination is the primary method used to find out if someone has DR right now. But new biomarkers might make this method easier and more open to more people. Different things and processes affect how DR starts, progresses, and can be predicted. These also affect how they are connected to treatments that target the fundamental harmful pathways. Asymmetric dimethylarginine, endothelin-1, advanced glycation end products, and the genetic control of DR through microRNAs are the major things that we are interested in.

Dar et al. (2023) [17] talked about how to treat and avoid diabetes retinopathy. Keeping your eyesight in good shape when you have diabetic retinopathy, a minor complication of diabetes, needs a proactive and all-around approach. The blood vessels in the retina slowly break down in this condition, which can sneak up on you and become a major threat to your vision. To effectively deal with this problem, blood glucose levels must be carefully managed through medications, food choices, and physical exercise. People can slow the progression of diabetic retinopathy and lessen its effects on eyesight by avoiding long-term high blood sugar levels, which are

the main cause of retinal damage. Laser therapies and anti-vascular endothelial growth factor shots are two medical treatments that can help with blood vessel growth and leakage that isn't working right. Regular eye exams are very important because they can find problems early, even if there aren't any clear symptoms, and allow for quick treatment before permanent damage happens. Taking preventative steps to avoid diabetic retinopathy is just as important as treating it. Keeping an eye on your blood pressure and fat levels and living a healthier life can improve your heart health, which in turn protects the fragile blood vessels in your retina. People with diabetes can greatly lower their risk of developing diabetic retinopathy by following diabetes management guidelines, eating a healthy diet, being physically active regularly, and not smoking. Along with efforts to make people more aware of eye health issues and teach them why regular checkups are important, this all-around approach gives people the tools they need to take charge of their own eye health, which protects the precious gift of sight.

Dávila, et al., 2023 [18] looked at global crises: Using the COVID-19 pandemic and natural disasters to learn how to make a strong emergency diabetic retinopathy plan for Puerto Rico. In this critical analysis, we look at how natural disasters and pandemics have a big effect on the care and commitment to treatment of diabetic retinopathy, a serious complication of diabetes that needs to be constantly monitored and treated to keep people from losing their sight. The social and economic situation of Puerto Rico is also looked at in our study, with a focus on recent disasters that have made public health problems worse. We looked at a lot of relevant literature from PubMed, Google Scholar, and the Himmelfarb Health Sciences Library database at George Washington University. Out of the 45 articles we looked at, 31 were relevant and focused on how these crises have affected healthcare delivery, screening for diabetic retinopathy, and treatment. There is a lot of proof that when these kinds of emergencies happen, the problems with getting medical care get worse. This makes treatment take longer and screening and diagnosing diabetic retinopathy less common, which leads to worse visual outcomes. As a result, our review shows how important it is to make successful emergency plans for diabetic retinopathy right away, especially in Puerto Rico where diabetes and its complications are much more common. Not only should these plans include tried-and-true emergency measures, but they should also take advantage of new technologies in the field of ophthalmology to make sure that people are best prepared for future pandemics and natural disasters.

Table 1. Comparative table of given information

Author and Year	Result	Finding
Aldahlawi, et al. (2024)	259 participants were involved in the study.	93% of those who answered knew that diabetes could make their eyes worse. 50.2% of the people who took the survey didn't know about any treatments for diabetes retinopathy. Not knowing enough about diabetic retinopathy was found to be a big reason why diabetic people don't get checked for eye diseases sooner. An important statistical link existed between the year of diagnosis and the amount of knowledge about eye problems. People knew a lot about diabetic retinopathy, but not as much about how to avoid it, like getting screened once a year.
Pandya, et al. (2024)	Comprehensive exploration of pan-retinal photocoagulation	PRP is emphasized as a key part of helping people with PDR

	(PRP) as an intervention for proliferative diabetic retinopathy (PDR).	recover their sight. The review talks about the importance of PDR in the context of diabetic retinopathy, as well as the challenges of the procedure, care after surgery, patient education, and the future of managing DR.
Błaszkiewicz, et al. (2023)	Look at new information and ideas about how diabetic retinopathy (DR) works at the molecular level.	Describes new factors and how they might help with diagnosing DR. This article looks at the roles that different factors and processes play in the development, progression, and prediction of DR, as well as how these play a part in therapeutic approaches.
Dar, et al. (2023)	Emphasizes proactive management and prevention of diabetic retinopathy.	Talks about the proactive and all-around approach needed to manage and prevent diabetic retinopathy. This includes keeping blood sugar levels under control, medical interventions like laser therapies and anti-VEGF injections, regular eye exams, and ways to avoid getting the disease by keeping an eye on blood pressure, lipid levels, lifestyle changes, and diabetes management protocols. Supports educating and raising knowledge in the community about how important it is to get regular eye exams so that people can take charge of their own eye health.
Dávila, et al. (2023)	Examination of the impact of global crises on diabetic retinopathy care.	Looks into how natural disasters and pandemics affect care for diabetic retinopathy, focusing on how treatment delays and fewer screenings and diagnoses happen during situations. It shows how important it is to have effective emergency plans for diabetic retinopathy, especially in places with a lot of it, like Puerto Rico. These plans should include both tried-and-true methods and the latest improvements in ophthalmology technology to be fully prepared.

III. RESEARCH METHODOLOGY

3.1. *Diabetic Retinopathy: Eye Damage Caused by Diabetes*

This is destruction to the the retina. the layer that is sensitive to light at the exterior of the eye which allows you see. Diabetes can cause it. High glucose levels damage your blood valves in the eye over time. If this isn't fixed, it can lead to many eye problems or even blindness.

Classification of Diabetic Retinopathy:

Diabetic retinopathy is classified into two main stages:

1. Nonproliferative Diabetic Retinopathy (NPDR): This is the earlier stage and can be further categorized based on severity:

- Mild NPDR: Microaneurysms (tiny bulges in blood vessels) appear in the retina.
- Moderate NPDR: Increased number of microaneurysms, dot and blot hemorrhages (small bleeds), and possible cotton wool spots (areas of blocked blood flow) are present.

2. Proliferative Diabetic Retinopathy (PDR): This is the more advanced stage, characterized by:

- Neovascularization: Growth of new, abnormal blood vessels on the surface of the retina. These vessels are fragile and can bleed easily, causing vision problems.
- Fibrovascular proliferation: Scar tissue forms around the new blood vessels, which can contract and distort the retina, leading to retinal detachment and vision loss.

To keep your eyesight, it's important to find and treat diabetes retinopathy as soon as possible. People with diabetes must have regular eye exams by an ophthalmologist to check on the health of their retinas. Depending on the stage and severity of diabetic retinopathy, laser treatment, medication injections into the eye, or even surgery may be able to help.

Diabetic retinopathy

It is a complex disease with various contributing factors. Here's a breakdown of the key elements involved in its pathophysiology:

Chronic Hyperglycaemia (High Blood Sugar):

- Elevated blood sugar levels over an extended period are the primary culprit in diabetic retinopathy.
- Excess glucose interacts with proteins and fats in the retinal blood vessels, leading to damage and dysfunction.

Microvascular Abnormalities:

- Hyperglycaemia weakens the walls of retinal blood vessels, making them more susceptible to leaking fluid and forming microaneurysms (weak bulges).
- Blood flow becomes sluggish, leading to ischemia (lack of oxygen) in retinal tissues.

Inflammation and Oxidative Stress:

- Chronic hyperglycemia triggers the release of inflammatory molecules, further damaging blood vessels and retinal cells.
- High blood sugar levels also lead to increased production of free radicals, which can damage cellular components.

Vascular Endothelial Growth Factor (VEGF):

- In response to ischemia, the retina releases VEGF, a growth factor that stimulates the growth of new blood vessels.
- However, the newly formed blood vessels in diabetic retinopathy are abnormal and fragile, prone to bleeding and further complications.

Stages of Diabetic Retinopathy:

1. Nonproliferative Diabetic Retinopathy (NPDR):

- Early stage characterized by microvascular abnormalities like microaneurysms, hemorrhages (bleeding), and exudates (lipid deposits).
- Macular edema (fluid accumulation in the macula) can occur in severe NPDR, blurring central vision.

2. Proliferative Diabetic Retinopathy (PDR):

- Advanced stage marked by the growth of abnormal new blood vessels (neovascularization) on the retina's surface.
- These vessels are fragile and can bleed, causing floaters (dark spots in vision) or vitreous hemorrhage (bleeding in the gel-like center of the eye).
- Scar tissue formation (fibrovascular proliferation) around these vessels can distort the retina, potentially leading to retinal detachment and severe vision loss.

3.2. Risk factors associated with the development and progression of diabetic retinopathy

Diabetic retinopathy is a major complication of diabetes, and several factors can increase your risk of developing or worsening the condition. Here's a breakdown of the key risk factors:

Poor Glycemic Control:

- Chronically high blood sugar levels are the single most significant risk factor for diabetic retinopathy. The longer and more severe your hyperglycemia, the greater the risk of developing and progressing retinopathy.

Duration of Diabetes:

- You are more likely to get diabetic retinopathy if you have had diabetes for a long time. The effects of high blood sugar build up over time and hurt the blood vessels in the eye.

Hypertension (High Blood Pressure):

- Uncontrolled high blood pressure puts additional stress on the already compromised retinal blood vessels, accelerating damage and progression of retinopathy.

Dyslipidemia (Abnormal Cholesterol Levels):

- High levels of LDL ("bad") cholesterol and triglycerides, along with low levels of HDL ("good") cholesterol, can contribute to the development and progression of diabetic retinopathy.

Pregnancy:

- Pregnancy can worsen diabetic retinopathy due to hormonal fluctuations and changes in blood sugar control. Women with diabetes require close monitoring during pregnancy to minimize risks.

Smoking:

- Smoking significantly increases the risk of diabetic retinopathy by further damaging blood vessels and hindering oxygen delivery to the retina.

Kidney Disease:

- Diabetic nephropathy (kidney disease) is often linked to a higher risk of developing and progressing diabetic retinopathy.

Other factors:

- **Genetics:** Some individuals may have a genetic predisposition to developing diabetic retinopathy.
- **Ethnicity:** Certain ethnicities, like Hispanics and African Americans, may have a higher risk compared to others.
- **Severe Sleep Apnea:** Studies suggest a possible link between severe sleep apnea and an increased risk of diabetic retinopathy.

3.3. Patient Perspectives on Diabetes and Diabetic Retinopathy

Patients with diabetes can have a wide range of perspectives on both the disease itself and the complication of diabetic retinopathy (DR). Here's a breakdown of some common themes:

Challenges with Diabetes Management:

- **Feeling overwhelmed:** Managing a chronic illness like diabetes can be complex, requiring constant monitoring of blood sugar, medication adherence, and lifestyle changes. This can lead to feelings of stress, anxiety, and frustration.
- **Dietary restrictions:** Diabetic meal plans can feel restrictive, impacting social aspects of eating and potentially leading to social isolation.
- **Maintaining motivation:** The long-term nature of diabetes management can make it challenging to stay motivated with healthy habits over time.

Limited Awareness of Diabetic Retinopathy:

- **Silent disease:** Early stages of DR often have no symptoms, leading to delayed diagnosis. Patients may not be aware of the risk or the importance of regular eye exams.
- **Fear of blindness:** The potential for vision loss associated with DR can be a significant source of anxiety and fear for patients.

Emotional Impact of DR Diagnosis:

- **Denial and anger:** Coming to terms with a new complication can be emotionally challenging. Some patients may experience denial or anger upon receiving a DR diagnosis.
- **Loss of independence:** Vision loss associated with DR can significantly impact daily activities and independence, leading to feelings of frustration and helplessness.

Importance of Patient Education and Support:

- **Understanding the disease:** Patients with diabetes benefit from comprehensive education about the disease, including risk factors for complications like DR.
- **Importance of eye exams:** Educating patients about the importance of regular eye exams for early detection of DR is crucial.

- **Support systems:** Connecting patients with support groups or diabetes management programs can provide valuable knowledge sharing and emotional support.

Treatment Experiences:

- **Burden of treatment:** Depending on the severity of DR, treatment may involve medications, laser procedures, or even surgery. This can add to the overall burden of managing diabetes.
- **Positive outcomes:** Early detection and treatment can significantly improve outcomes and potentially prevent vision loss. Patients who experience successful treatment may feel a sense of relief and renewed hope.

IV. DISCUSSION

For complete diabetes care, it is important to know how diabetic retinopathy (DR) affects how people with diabetes think about their condition. A common and possibly sight-threatening complication of diabetes is diabetic retinopathy. This condition not only affects patients physically, but it also has a big effect on their mental and emotional health. When you look deeper into this effect, you'll find many layers that affect how people with diabetes see their journey.

For starters, diabetic retinopathy is a real-life example of how diabetes affects the body as a whole. People with diabetes often think that changes in their eyes are directly related to how well or poorly they are managing their diabetes. The development of retinopathy can serve as a stark reminder of how important their condition is, making them more aware and motivated to better manage their blood sugar levels and follow their treatment plans. On the other hand, some patients may feel guilty or blame themselves for not properly managing their diabetes after being diagnosed with retinopathy. This can make their emotional problems worse and possibly change how they feel about their general health.

Second, diabetic retinopathy can have a big effect on a person's daily life and quality of life. Having trouble seeing because of retinopathy can make it hard to do many things on your own, like drive, read, and do daily chores. This functional limitation can make people angry, reliant on others, and feel like they've lost control, which can make them think badly about diabetes and how to handle it. Fear of losing their sight and what that might mean for their future freedom and employment can also cause a lot of stress and uncertainty among patients, which changes how they see living with diabetes even more. Furthermore, diabetic retinopathy has an effect on people's mental health that goes beyond the individual patient and includes their relationships and exchanges with others. Family members and caregivers may feel more worry and emotional stress when they see a loved one deal with vision loss and the problems that come with it.

V. CONCLUSION

Looking into how diabetic retinopathy (DR) changes how people with diabetes feel about their condition shows how complicated the links are between physical health, mental health, and social relationships. Many important things have been learned about how disease reversal (DR) affects people's thoughts on their experience with diabetes during this study.

DR is a tactile reminder of how diabetes affects the whole body, which encourages patients to reevaluate how they are managing their diabetes and stick to their treatments. When someone is diagnosed with retinopathy, they often become more aware of how serious their illness is. This makes them more likely to focus on controlling their blood sugar and adopt healthier living habits. Still, for some people, the start of retinopathy may make them feel ashamed or guilty about themselves. This highlights the need for understanding and helpful care to reduce mental stress and increase patient empowerment. In addition, the limitations on function caused by DR can have a big effect on patients' quality of life and independence. Vision loss caused by retinopathy makes it hard to do important things like drive, read, and find your way around, which can make you feel frustrated and dependent on others. Patients may feel more uneasy and doubtful when they think about more decline and what that might mean for their future independence. This shows how important it is to use comprehensive care methods that address both physical and mental needs. DR's psychological effects are felt by

more than just the person who has it; they also affect relationships and support networks. Family members and caregivers are worried and stressed out more, which shows how important it is to have support networks that include both patients and their loved ones. Healthcare workers can help people deal with the problems that come with DR by encouraging open communication, providing resources for coping and adaptability, and building up social support networks. Taking these points into account, it is clear that a complete plan including medical treatment, psychological help, and community involvement is needed to successfully deal with the effect of DR on patients' views of diabetes. To get the best results and quality of life for people with DR, it's important to let them be involved in their own diabetes control, help them become more resilient when things go wrong, and fight for healthcare environments that are welcoming to everyone.

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