PREVALENCE OF MICROVASCULAR COMPLICATIONS "DIABETIC WITH NEPHROPATHY, NEUROPATHY AND RETINOPATHY" IN TYPE-II DIABETIC PATIENTS: A RETROSPECTIVE STUDY

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Abstract

Diabetes mellitus (DM) poses a significant global health challenge due to its widespread complications. This retrospective study focuses on the prevalence and management of microvascular complications—neuropathy, retinopathy, and nephropathy—in type 2 diabetes mellitus (T2DM) patients. Conducted at Parul Sevashram Hospital, the study evaluated 100 patients over six months. The findings revealed that diabetic retinopathy (35%) was the most prevalent complication, followed by nephropathy (34%) and neuropathy (30%). Women and individuals aged 66–75 were particularly affected. Symptoms varied from general issues, such as fatigue and nausea, to specific signs like numbness and blurred vision. Diagnostic methods included blood sugar testing, fundoscopy, and urine albumin screening. Management predominantly involved metformin and glimepiride, with newer therapies like dapagliflozin gaining traction. For neuropathy, pregabalin and ibuprofen were commonly prescribed, while retinopathy treatments included ranibizumab and laser photocoagulation. Nephropathy management primarily involved peritoneal dialysis. The study highlights the importance of personalized, multimodal strategies to address T2DM complications effectively.

Keywords: HTN (hypertension), DM-2 (Type-2 diabetes mellitus), CBC (complete blood count), T. Metformin

Introduction

Diabetes mellitus (DM), a chronic metabolic condition characterized by persistent hyperglycemia, is a growing global health concern. By 2017, over 425 million cases of diabetes were reported globally, with type 2 diabetes mellitus (T2DM) comprising the majority. This number is expected to rise due to factors such as obesity and aging

populations【1】. T2DM is primarily associated with insulin resistance and beta-cell dysfunction, exacerbated by lifestyle factors like physical inactivity, poor dietary habits, and hypertension【2】.

A significant concern in diabetes management is the prevalence of microvascular complications, including diabetic retinopathy, nephropathy, and neuropathy, which arise from the deleterious effects of prolonged hyperglycemia on capillaries【3】. Retinopathy, the leading cause of vision loss in working-age adults, is marked by retinal ischemia, microaneurysms, and neovascularization【4】. Nephropathy, the primary cause of end-stage renal disease, manifests through proteinuria and progressive renal dysfunction due to glomerular damage caused by hyperglycemia and hypertension【3,4】. Neuropathy, impacting peripheral and autonomic nerves, results in symptoms like numbness, chronic pain, and gastroparesis【5】.

Early detection and personalized management are critical for mitigating the progression of these complications. Glycemic control, blood pressure regulation, and routine screenings, such as fundoscopy and urine albumin testing, have proven effective in reducing risks【3,4】. However, delayed diagnosis and inconsistent management continue to exacerbate the burden of microvascular complications.

This study examines the prevalence, diagnostic methods, and management approaches for microvascular complications in T2DM patients, providing insights for improved patient care strategies【6】.

Materials and Methods

This retrospective observational study was conducted at Parul Sevashram Hospital, Vadodara, over six months (September 2023 to February 2024) following ethical approval. The study included 100 type 2 diabetes mellitus (T2DM) patients aged 35 years and above with microvascular complications, selected based on inclusion and exclusion criteria. Data were retrieved from the hospital's medical records department using a customized data collection form, capturing demographics, clinical history, treatment details, and laboratory parameters. Exclusion criteria included incomplete records, pregnancy, and liver disease. Diagnostic evaluations included blood sugar

testing, fundoscopy, urine albumin screening, complete blood counts, and monofilament testing. Data analysis focused on identifying the prevalence of diabetic retinopathy, neuropathy, and nephropathy, alongside management approaches. Statistical analyses summarized the distribution of complications, their duration, and treatment regimens. The study aimed to provide insights into the multimodal management of microvascular complications in T2DM patients.

RESULTS

This study investigated the prevalence, duration, symptoms, diagnostic measures, and treatment approaches for microvascular complications in Type 2 Diabetes Mellitus (T2DM). Below are the findings structured under different parameters.

Age-Wise Distribution

Out of the 100 patients included in this study, most were in the age group of 65–75 years (25%), followed by 56–65 years (23%). Patients aged 76–85 years accounted for 14%, while those older than 86 years comprised 13%. These findings suggest that T2DM microvascular complications are more prevalent in older adults, particularly between 65 and 75 years.

Gender Distribution

Gender analysis revealed that women (53%) were slightly more affected by microvascular complications than men (46%), with 1% of patients preferring not to disclose their gender. This data indicates that females have a marginally higher susceptibility to these complications, which might be linked to hormonal and metabolic differences.

Dietary Habits

Among the patients, 59% were vegetarians, while 41% consumed a non-vegetarian diet. The higher prevalence in vegetarians indicates that dietary patterns, while potentially linked to cultural or regional influences, may have limited impact on the progression of microvascular complications.

Body Mass Index (BMI)

The BMI analysis revealed that 35% of patients had a BMI in the range of 23–24, the most prevalent category. Patients with BMIs of 25–26 constituted 16%, while those in the 21–22 range accounted for 14%. The study did not find a strong correlation between BMI and the severity or progression of microvascular complications.

Duration of Diabetes

The duration of diabetes was another significant factor. Most patients (36%) had been living with T2DM for 5–6 years, followed by 26% with a disease duration of 3–4 years. Patients with T2DM for more than 8 years comprised 22%, and those in the 7–8-year group made up 16%. This trend suggests that the risk of microvascular complications increases with disease chronicity.

Prevalence of Microvascular Complications

Among the complications assessed, diabetic retinopathy was the most prevalent, affecting 35% of patients, followed closely by diabetic nephropathy (34%) and diabetic neuropathy (30%). One patient had both diabetic retinopathy and nephropathy, highlighting the potential overlap of complications in T2DM.

Duration of Specific Complications

The duration of complications varied. Diabetic retinopathy was most common among patients diagnosed within the last 1–2 years (48%). For diabetic neuropathy, the largest group (45%) had symptoms for 3–4 years, while for diabetic nephropathy, 31% reported having it for 3–4 years as well.

Table 1: Prevalence and Duration of Microvascular Complications

Complication	Prevalence (%)	Most Common Duration (Years)
Diabetic Retinopathy	35%	1–2

Diabetic Neuropathy	30%	3–4
Diabetic Nephropathy	34%	3–4

Symptoms

The most frequently reported symptoms were nausea and vomiting (80%), followed by loss of appetite (65%) and numbness or reduced sensation in limbs (68%). Other prevalent symptoms included digestive issues such as bloating and constipation (63%), fatigue (60%), and blurred vision (40%). These symptoms align with the clinical manifestation of microvascular complications in diabetes.

Diagnostic Measures

The most commonly performed diagnostic tests were blood sugar tests (99%), complete blood counts (CBC) (100%), and urine albumin screening (80%). Fundoscopy was performed in 38% of patients, primarily for diagnosing retinopathy, while monofilament testing (30%) was used for neuropathy. These diagnostic approaches highlight the importance of a multimodal strategy for detecting complications.

Blood Sugar Levels

Blood sugar analysis showed that 37% of patients had random blood sugar levels exceeding 205 mg/dL, while 25% were in the range of 186–195 mg/dL. Fasting blood sugar levels between 131–140 mg/dL were observed in 29% of patients. HbA1C levels indicated poor glycemic control in a majority, with 37% of patients in the range of 7.5–8.4% and 11% having levels exceeding 8.4%.

Table 2: Blood Sugar and HbA1C Levels

Parameter	Range	Percentage (%)
Random Blood Sugar	>205 mg/dL	37%
Fasting Blood Sugar	131–140 mg/dL	29%
HbA1C Levels	7.5–8.4%	37%

Treatment Approaches

For managing T2DM, metformin was the most commonly prescribed medication (79%), followed by glimepiride (66%). Dapagliflozin was given to 25% of patients, while insulin therapy was required in only 19%. These findings underscore the reliance on oral hypoglycemics, with newer agents like dapagliflozin gaining popularity.

Specific treatments for complications included pregabalin (77%) and ibuprofen (83%) for diabetic neuropathy. For diabetic retinopathy, nepafenac eye drops (61%) and laser photocoagulation (39%) were common, while peritoneal dialysis (68%) was the preferred treatment for nephropathy.

DISCUSSION

This retrospective study evaluated the prevalence and management of microvascular complications in type 2 diabetes mellitus (T2DM) patients. Among 100 patients, diabetic retinopathy was the most common complication (35%), followed closely by diabetic nephropathy (34%) and neuropathy (30%), aligning with prior studies on microvascular burden in diabetes【7】【8】. Women exhibited higher prevalence rates than men, with the majority of cases observed in the 66–75 age group, consistent with reports linking hormonal and metabolic factors to gender-specific disease progression【9】【10】.

Vegetarian diets correlated with higher complication rates, possibly due to insufficient nutrient diversity impacting glycemic control【11】. Long-standing diabetes (>5 years) showed significantly higher complication incidences, emphasizing the role of chronic hyperglycemia in vascular damage【12】. Effective management combined metformin and glimepiride with adjunct therapies tailored to specific complications,

such as Pregabalin for neuropathy and laser photocoagulation for retinopathy【13】【14】.

This study reinforces the necessity of early detection and personalized multimodal therapy to mitigate diabetes-related complications.

SUMMARY AND CONCLUSION

This study evaluates the prevalence, symptoms, and management of microvascular complications in Type 2 Diabetes Mellitus. Diabetic retinopathy was the most common complication (35%), followed by nephropathy (34%) and neuropathy (30%). Women and patients aged 66–75 years were more affected. Vegetarian diets and longer diabetes duration increased incidence. Key symptoms included nausea, numbness, and blurred vision. Diagnostic methods like fundoscopy and blood sugar tests were widely used. Treatment predominantly involved metformin, glimepiride, and dapagliflozin for glycemic control, with specific therapies for complications. The findings underscore the need for personalized, multimodal strategies for effective management of diabetic microvascular complications.

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