THE IMPORTANCE OF OPTICAL COHERENCE TOMOGRAPHY IN THE DIAGNOSIS OF DIABETIC RETINOPATHY

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https://doi.org/10.5281/zenodo.18995647

ARTICLE INFO

Received: 08th March 2026
Accepted: 10th March 2026
Online: 12th March 2026

KEYWORDS

Macular edema, intraretinal fluid, microaneurysms

ABSTRACT

Diabetic retinopathy is one of the complications of type 2 diabetes mellitus and develops as a result of long-term elevated blood glucose levels that damage the retinal capillaries. According to conducted studies, different stages of retinopathy were identified in 55.2% of patients with diabetes (stage 1 – 17.6%, stage 2 – 28.1%, stage 3 – 9.5%). Complete blindness occurs in only 2% of patients. Initially, visometry and ophthalmoscopy are used for the diagnosis of retinopathy. However, optical coherence tomography (OCT) is a non-invasive diagnostic method that provides high-resolution 3D imaging data, which helps detect subclinical edema that cannot be identified during ophthalmoscopy, particularly enabling the early diagnosis of diabetic macular edema that threatens vision.

Aim. To determine the significance of optical coherence tomography in the diagnosis of diabetic retinopathy in patients with type 2 diabetes mellitus.

Materials and Methods. The study involved 50 patients aged between 35 and 50 years, with an average age of 40–45 years, who underwent examination in 2024. According to their medical history, all patients had been diagnosed with type 2 diabetes mellitus for 3–15 years. Initially, all patients underwent ophthalmoscopy and fundus photography, after which they were referred for optical coherence tomography (OCT) examination.

Results. Among the 50 examined patients, diabetes duration exceeded 10 years in 10 patients, 5 years in 8 patients, and 3 years in 5 patients. The results of the study showed that retinopathy was more frequently observed in patients who had diabetes for more than 10 years, particularly among middle-aged and older patients (40–45 years) with arterial hypertension. Diabetic retinopathy was not associated with gender, as it occurred with equal frequency in both men and women. According to ophthalmoscopy and fundus photography,30% of patients showed microaneurysms, 10% of patients had signs suspicious for macular edema. Optical coherence tomography (OCT) provided precise and detailed information about the condition of the retina and macula. Based on OCT findings: 70% of patients demonstrated structural changes in retinal layers. 40% showed central macular thickening. 25% of patients had macular edema or accumulation of intraretinal fluid. However, 30% of patients showed relatively normal retinal structures.. Findings. The demographic characteristics of the 50 patients participating in the study were as follows:. Mean age: 43.2 ± 4.1 years. Men: 52% (26 patients). Women: 48% (24 patients). Distribution according to the

duration of diabetes:3–5 years: 15 patients (30%). 5–10 years: 25 patients (50%). More than 10 years: 10 patients (20%). The average HbA1c level was 8.6 ± 1.4%.. As shown in the table, OCT examination demonstrated significantly higher diagnostic accuracy compared with ophthalmoscopy in almost all parameters. In particular, OCT was 2.5 times more effective in detecting intraretinal fluid accumulation, which is crucial for the early treatment of diabetic macular edema.

Conclusion. According to the results of the study, optical coherence tomography provides a more precise and earlier detection of pathological changes in the retina and macula compared with ophthalmoscopy and visometry. The probability of developing diabetic retinopathy increases with the duration of diabetes. OCT plays an important role not only in identifying existing structural changes but also in monitoring the effectiveness of treatment. It is especially valuable for evaluating the effectiveness of intravitreal anti-VEGF injections. Maintaining proper glycemic control (HbA1c < 7%) and undergoing regular ophthalmologic examinations are key factors in preventing diabetic retinopathy. In the future, artificial intelligence-based OCT angiography (OCT-A) systems are expected to significantly expand the possibilities of early diagnosis.

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