



ORIGINAL ARTICLE

Short-Term outcomes in patients with center-involving diabetic macular edema after a single dose of Intravitreal Bevacizumab.

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Article Citation: Khan AA, Iqbal S. Short-Term outcomes in patients with center-involving diabetic macular edema after a single dose of Intravitreal Bevacizumab. Professional Med J 2025; 32(12):1708-1712. <https://doi.org/10.29309/TPMJ/2025.32.12.9927>

ABSTRACT... Objective: To evaluate short-term outcomes in patients with center-involving diabetic macular edema (ciDME) after a single dose of intravitreal bevacizumab (IVB). **Study Design:** Descriptive Study. **Setting:** Department of Ophthalmology, Hayatabad Medical Complex, Peshawar. **Period:** 19th September 2024 to 19th March 2025. **Methods:** A total of 140 patients with type 2 diabetes mellitus and ciDME were included using a nonprobability consecutive sampling technique. Patients who had received prior anti-vascular endothelial growth factor therapy, intraocular steroids, or retinal laser treatment within the past year were excluded. Pre-injection and post-injection best-corrected visual acuity (BCVA) and central macular thickness (CMT) were measured using the Snellen chart and optical coherence tomography (OCT), respectively. Statistical analysis was performed using SPSS version 23. **Results:** A total of 140 patients were included, with a male-to-female ratio of 60:40. The median (IQR) age was 58.50 (8.75) years. CMT significantly decreased from 468.7 (42.9) μ m pre-injection to 441.8 (42.42) μ m post-injection ($p = 0.001$), indicating a significant anatomical response. The median BCVA pre- and post-injection remained 0.780, but the Wilcoxon Signed-Rank test showed a significant p -value of 0.001, suggesting subtle visual function changes. Age and gender did not significantly impact BCVA or CMT outcomes ($p > 0.05$). **Conclusion:** A single dose of intravitreal bevacizumab significantly reduces central macular thickness in patients with center-involving diabetic macular edema. While BCVA changes were statistically significant, they remained clinically limited over a short-term follow-up. Age and gender did not influence treatment response.

Key words: Anti-VEGF, Best-corrected Visual Acuity, Central Macular Thickness, Diabetic Macular Edema, Intravitreal Bevacizumab, Short-term Outcomes.

INTRODUCTION

The most frequent cause of visual impairment in diabetic patients is diabetic macular edema (DME).¹ According to estimates, 28% of patients with type 2 DM over 20 years and 27% of patients with type 1 Diabetes Mellitus (DM) over 9 years will acquire Diabetic Macular Edema (DME) after the commencement of the disease.² Both the developed and developing worlds' working-age populations are impacted.³

Changes in cellular junctions, thickening of the capillary basement membrane, loss of pericytes and endothelial cells, impaired leukocyte function, and vitreoretinal traction are some of the multifactorial mechanisms that cause changes in the blood-retinal barrier. These changes set off an inflammatory response, inflammatory mediator

secretion, cellular hypoxia, and the subsequent release of growth factors and oxidative stress.^{4,5}

According to a recent news release from the Baqai Institute of Diabetology and Endocrinology (BIDE), 26% of Pakistanis have diabetes.⁶ According to some estimates, the prevalence of diabetic retinopathy that threatens vision is between 4% and 7%.⁷ Occular Coherence Tomopgraphy (OCT) is currently the most widely used test for follow-up and assessing treatment response, and it is one of the primary methods utilized in the diagnosis of DME.⁸

The first-line treatment for patients with center-involving DME (ciDME) who also have strict metabolic control is intravitreal injections of anti-vascular endothelial growth factor (anti-VEGF)

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Article received on: 24/06/2025

Date of revision: 16/07/2025

Accepted for publication: 29/08/2025

inhibitors.^{1,2,3} The current standard of care for centers involvement diabetic macular edema (ciDME) is anti-vascular endothelial growth factor (anti-VEGF) medications, which have been demonstrated to be more effective than macular laser photocoagulation in the treatment of DME.^{2,4,6}

In study conducted by Maryam AK et al on 54 patients with DME, which were subjected to intravitreal bevacizumab. They were followed for span of 1 month and the patient reported improvement in best corrected visual acuity (BVCA).¹

The rationale of this study was to evaluate short-term outcomes in patients with center-involving diabetic macular edema after a single dose of intravitreal bevacizumab (IVB). The results of this study will be used to develop future research and policy recommendations regarding the treatment of diabetic retinopathy with central macular edema.

OBJECTIVE

To evaluate short-term outcomes in patients with center-involving diabetic macular edema after a single dose of intravitreal bevacizumab

METHODS

After the research outline was approved, this descriptive study was carried out at the Department of Ophthalmology, MTI Hayatabad Medical Complex, Peshawar, from September 19, 2024, to March 19, 2025. Using a nonprobability sequential sampling technique, 140 individuals with a diagnosis of ciDME were included. The sample size was determined using the WHO sample size calculator, keeping a proportion of 10% of patients with BCVA better than 6/18 after IVB, with a 95% confidence interval and a 5% margin of error.⁹

Individuals with type 1 or type 2 diabetes mellitus and ciDME who were between the ages of 18 and 70 were eligible to participate. Participants were limited to those who received a single intravitreal dose of bevacizumab. Prior intraocular steroid or anti-VEGF treatment within the last 12 months,

focal laser therapy for macular edema or pan-retinal photocoagulation, vitreoretinal surgery, and missing imaging were among the exclusion criteria. Additionally, patients who were lost to follow-up after a month were not included.

At Hayatabad Medical Complex, all eligible patients got a single dosage of IVB after Institutional Review Board ((IRB No: HMC-QAD-F-1570 on 15 Sep 2023) approval. Prior to the intervention, informed consent was acquired. The Snellen chart was used to evaluate the baseline BCVA, and OCT was used to measure the CMT. In a sterile operating area, the IVB injection technique was carried out. Following topical tetracaine 1% anesthetic, 10% povidone-iodine was used to disinfect the periocular skin, eyelids, and eyelashes. After inserting an eyelid speculum, the fornices and ocular surface were washed for two minutes with 5% povidone-iodine. A 30-gauge needle was used to inject 2.5 mg (0.1 ml) of bevacizumab (Avastin; Genentech Inc., South San Francisco, CA) intravitreally. BCVA and CMT were reviewed over the month-long follow-up period with the patients. A pre-made questionnaire was used to collect demographic information, such as age, gender, comorbidities, afflicted eye (left or right), and type of diabetes mellitus.

SPSS version 23 was used to analyze the data. Normality was evaluated using the Shapiro-Wilk test. Depending on normality, the mean (SD) or median (IQR) were used to evaluate continuous variables. Pre- and post-injection CMT comparisons were made using paired t-tests, while BCVA comparisons were made using the Wilcoxon Signed-Rank test. The association between age and BCVA/CMT was evaluated using Spearman correlation analysis. Gender differences in BCVA and CMT were compared using independent t-tests and Mann-Whitney U tests. P-values less than 0.05 were regarded as statistically significant.

RESULTS

Total of 140 patients with ciDME were included in the study .Normality test showed that age, preinjection BCVA and Post injection BCVA were

not normally distributed. The median (IQR) of age was 58.50(8.75). The median (IQR) of pre injection BCVA and Post injection BCVA log MAR was 0.780(0.40) and 0.780(0.49) respectively. The mean Pre injection and post injection on follow up CMT was 468.7(42.9) and 441.8(42.42) respectively. The male comprised of n=84(60%) while female were n=56(40%) of sample. All patients were of type 2 diabetes. Equal number of both eyes were effected i.e. 70(50%) right side and 70(50%) patients had left eye effected. (summarized in Table-I)

Variable	Median (IQR) / Mean (SD)	Frequency (%)
Age (Years)	58.50 (8.75)	-
Gender	-	-
Male	-	84 (60%)
Female	-	56 (40%)
Eye Affected	-	-
Right Eye	-	70 (50%)
Left Eye	-	70 (50%)
Pre injection BCVA(Log MAR)	0.780 (0.40)	-
Post injection BCVA (Log MAR)	0.780 (0.49)	-
Preinjection CMT	468.7 (42.9)	-
Postinjection CMT	441.8 (42.42)	-

Table-I. Demographic and clinical characteristics of the patients

BCVA: Best Corrected Visual Acuity

CMT: Central Macular Thickness

Paired t sample of pre injection and post injection CMT showed significance of 0.001 while Wilcoxon Signed-Rank Test of pre injection and post injection BCVA also showed significant p value of 0.001. (summarized in Table-II)

Test	Mean / Median (IQR)	P-Value
Paired t-test (CMT)	Pre-op: 468.7 (42.9)	0.001
	Post-op: 441.8 (42.42)	
Wilcoxon Signed-Rank (BCVA)	Pre-op: 0.780 (0.40)	0.001
	Post-op: 0.780 (0.49)	

Table-II. Comparison of pre injection and post injection outcomes

According to Spearman correlation analysis in Table-III showed age was not correlated with pre injection and post

injection BCVA and CMT.

Variable	Age (Spearman's rho)	P-Value
Preoperative BCVA	0.188	0.245
Postoperative BCVA	0.131	0.420
Preoperative CMT	0.171	0.292
Postoperative CMT	0.219	0.175

Table-III. Correlation of age with BCVA and CMT

Since age was not normally distributed, Spearman correlation was used to assess its relationship with BCVA and CMT.

BCVA: Best Corrected Visual Acuity

CMT: Central Macular Thickness

Also independent t test as summarized in Table-IV, showed that gender was not significant in both pre and post injection BCVA and CMT.

Variable	Test Used	p-value (Sig. 2-tailed)
Preoperative BCVA	Mann-Whitney U	0.863
Post Operative BCVA	Mann-Whitney U	0.919
Preoperative CMT	Independent t-test	0.988
Post Operative CMT	Independent t-test	0.596

Table-IV. Comparison of BCVA and CMT based on gender

BCVA: Best Corrected Visual Acuity

CMT: Central Macular Thickness

DISCUSSION

The results of this study shed important light on how individuals with ciDME fare clinically after receiving treatment. There were 140 individuals with type 2 diabetes in all, evenly distributed by gender and eye condition. The results showed significant improvements in BCVA and CMT after treatment, as indicated by the Wilcoxon Signed-Rank Test and the paired t-test, respectively. The Spearman correlation and independent t-test analyses, however, also demonstrated that age and gender had no discernible effects on treatment outcomes.

The improvement in BCVA (median logMAR remained 0.780, but with a significant p-value of 0.001) and the considerable decrease in CMT

(from 468.7 μm to 441.8 μm , $p = 0.001$) are consistent with previous research. Anti-VEGF or corticosteroid therapies have been shown in numerous studies to stabilize or improve BCVA in DME patients while statistically significantly lowering CMT. In line with the results of this investigation, for example, Maryam AK et al., Turski CA et al., Bafaraj AN et al., and Sędziak-Marcinek B et al. discovered that intravitreal injections led to a mean decrease of CMT.^{10,11,12,13}

Despite the lack of a dramatic improvement, Sędziak-Marcinek B et al., Mushtaq B et al., and Abdel-Maboud M et al. also support the stabilization of BCVA, noting that although BCVA may not always improve significantly, halting further vision loss is a crucial outcome in DME management.^{13,14,15}

The absence of a relationship between age and treatment results, however, runs counter to recent research that indicates aging may be linked to worse visual outcomes in DME. For instance, elderly patients were more likely to have chronic macular edema and responded to treatment more slowly, according to Ercalik NY et al.¹⁶ Similarly, the results of Moon J et al.¹⁷, are consistent with the lack of a substantial gender-based difference in treatment outcomes.

The study's conclusions highlight how well-suited the available treatment approaches are for lowering CMT and maintaining BCVA in ciDME patients. Given that age and gender have little effect on results, clinical characteristics rather than demographic considerations may be the primary basis for treatment decisions. But the study also emphasizes the need for more investigation into how other factors, such the length of diabetes, glycemic control, and systemic comorbidities, affect the course of treatment.

This study has several limitations. First, the retrospective design may introduce selection bias. Second, the relatively small sample size and single-center nature of the study may limit the generalizability of the findings. Third, the lack of long-term follow-up data prevents an assessment of the durability of treatment effects.

Future studies should address these limitations by employing a prospective, multicenter design with extended follow-up periods.

CONCLUSION

In conclusion, this study demonstrates that treatment for ciDME leads to significant anatomical and functional improvements, as evidenced by reductions in CMT and stabilization of BCVA.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

1	Arqam Ali Khan: Manuscript writing, drafting, data collection, proof reading.
2	Sofia Iqbal: Statistical analysis, proof reading.