

# Efficacy of Intravitreal Triamcinolone Acetonide in Diabetic Macular Edema

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## ABSTRACT

Diabetic macular edema (ME) can be treated by intravitreal injection of Triamcinolone acetonide (TA). The scope of the study was to determine its efficacy in our setup in order to develop our local guidelines for its routine use in our setup.

**Objective:** To determine the effect of intravitreal Triamcinolone (TA) for the management of diabetic macular edema (ME)

**Material and Methods:** This descriptive case series carried out at Al-Shifa Trust Eye Hospital, Rawalpindi in 2019. Total 149 patients cases of either gender aged 40-75 years with history of DM of >10 years, VA<6/36 assessed by Snellen VA chart and who had clinically significant ME as assessed by indirect ophthalmoscopy were included in the study. 4mg/0.1 ml of TA was injected through pars plana under local anesthesia. Efficacy was determined at six week post treatment.

**Results:** Treatment was found to be effective in overall 40.9%(n=61) cases, 44.7%(n=38) males, 35.9%(n=23) were females, 35.1%(n=20) were between 41-50 years age, 42.9%(n=30) between 51-60 years, 50%(n=11) had >60 years, 44.5%(n=49) at baseline VA of 6/36 and 30.8%(n=12) with baseline VA of 6/60 showed improvement in VA.

**Conclusion:** Administration of triamcinolone acetonide (TA) intravitreal inj. is an effective modality for the treatment for diabetic macular edema, and this treatment may lead to an improvement in visual acuity

**Keywords:** Diabetic Retinopathy, Macular Edema (MA), Triamcinolone, Acetonide

## INTRODUCTION

Individuals who have diabetic retinopathy often suffer from diabetic macular edema, which is a manifestation of diabetic retinopathy<sup>1-3</sup> that causes a loss of central vision and is one of the leading causes of visual impairment in these patients. In the treatment of diabetic retinopathy, the low frequency of improvement following focused or grid laser photocoagulation has sparked research in alternate therapeutic methods including intravitreal injection of triamcinolone acetonide.

Diabetic retinopathy progressively damages retinal blood vessels, results in blood-retinal-barrier break-down leading to increased vascular permeability. Diabetic macular edema (DME) occurs when blood constituents leak from compromised vessels into the surrounding tissue and macula and collect within it. Ten year incidence rates for clinically significant DME are 20.1% for type-1 and 13.9% for type II diabetics.<sup>4</sup>

Edema of the retina is a consequence of the breakdown of the blood-retinal barrier that is caused by Vascular Endothelial Growth Factor, or VEGF. VEGF is up-regulated in diabetic retinopathy and is present at increased levels in individuals with diabetic macular edema and proliferative diabetic retinopathy. These patients also have increased amounts of VEGF in both aqueous and vitreous humours.<sup>5</sup>

Currently, the demonstrated is known as reduced risk of loss of vision from diabetic ME include: Intensive glycemic control, focal or grid laser photocoagulation, Pars plana vitrectomy and Injection Bevacizumab.

Triamcinolone leads to pharmacological attenuation of the effects of VEGF and is a corticosteroid having anti-inflammatory effect which has been demonstrated to inhibit the expression of VEGF gene. Other treatment modalities for DME have complications and limitations like despite multiple attempts of photocoagulation, a sufficient number of eyes remain unresponsive to treatment.<sup>6</sup>

In a clinical trial conducted at Al-Shifa trust Eye Hospital, Rawalpindi, improvement in VA was in 82% cases with intravitreal Triamcinolone Acetonide injection.<sup>7</sup> A randomized clinical trial showed that patients treated with intravitreal Triamcinolone Acetonide showed better visual acuity in 56% eyes, and reduced macular thickness was recorded on follow up when compared to those patients receiving placebo, carried out at deptt. of Ophthalmology, University of Sydney, Australia.<sup>8</sup> In another study, in Dzech, visual acuity improved in 55% eyes among patients with DME and stabilized in 25% eyes. In a study conducted in France, visual acuity improved in 67.8% in 2 months for DME.

The scope of the trial is to determine the efficacy of intravitreal Triamcinolone Acetonide injection to treat diabetic macular edema because Triamcinolone is safe, in expensive, easy to administer and readily available and the reported efficacy in literature was different in various other studies. In our studies if the efficacy of the Triamcinolone is found to significantly high as compared to previous study than the results of this study was compared with other ophthalmologists and recommendations may be given for routine use for all patients with DME.

## MATERIAL AND METHODS

This descriptive case series carried out at Al-Shifa Trust Eye Hospital, Rawalpindi in 2019. Total 149 patients cases of either gender aged 40-75 years with history of DM of >10 years, VA<6/36 assessed by Snellen VA chart and who had clinically significant ME as assessed by indirect ophthalmoscopy were included in the study. We excluded those cases having macular edema other than due to diabetes mellitus as determined by history, any other retinal vascular pathology e.g. Central retinal Vein Occlusion, Branch Retinal Vein Occlusion etc, as determined by slit lamp examination, patients with ocular inflammation e.g. Uveitis, Scleritis etc, as determined by slit lamp examination, history of neurological diseases e.g. multiple sclerosis, optic atrophy, history of trauma to eye, were excluded from the study.

All patients were subjected to detailed history and clinical examination. Under the supervision of an expert ophthalmologist having minimum five years of experience, 4mg/0.1 ml of TA was injected through pars plana, 3.5 mm from limbus inferotemporally, under local anesthesia with 0.5% Proparacaine. After injection all patients were kept under observation in the OPD for 30 minutes and then discharged. Followup was advised at the end of 6<sup>th</sup> week to determine the efficacy in terms of improvement in at least one line on Snellen's chart. We used 19<sup>th</sup> version of SPSS for data analysis.

## RESULTS

The average age of cases was 53.48 ± 7.03 years with least and highest age as 41 and 66 years. There were 35.1%(n=20) between 41-50 years age, 42.9%(n=30) between 51-60 years, 50%(n=11) had >60 years, 44.7%(n=38) males, 35.9%(n=23) were females, 44.5%(n=49) at baseline VA of 6/36 and 30.8%(n=12) with baseline VA of 6/60 showed improvement in VA. The treatment was found to be effective in overall 40.9%(n=61) cases.

Table-1: Efficacy with respect to age groups (years)

Age(years)	Efficacy		Total	P value
41-50	20(35.1%)	37(64.9%)	57	0.43
51-60	30 (42.9%)	40(57.1%)	70	
>60	11 (50%)	11(50%)	22	
Total	61 (40.9%)	88(59.1%)	149	

Table-2: Efficacy with respect to gender groups

Gender	Efficacy		Total	P value
Male	38(44.7%)	47(55.3%)	85	0.28
Female	23(35.9%)	41(64.1%)	64	
Total	61 (40.9%)	88(59.1%)	149	

## DISCUSSION

Our findings were quite in concordance with the previously published reports on the same issue. Intravitreal triamcinolone acetonide (IVA) has been shown to improve visual acuity and macular thickness in patients with macular edema associated with various retinal vascular diseases, according to a prospective, nonrandomized clinical interventional research by Tewari HK.<sup>9</sup>

At the end of one month and three months, mean central macular thickness was reduced significantly ( $p < 0.05$ ) in all 3 groups, regardless of which group was injected (Group I, 218.2 $\pm$ 99 micron, Group II, and Group III, 300.7 $\pm$ 119 micron in Group I, 218.2 $\pm$ 99 micron, and Group III, 210.5 $\pm$ 56 micron, respectively) whereas mean visual acuity was increased in all three groups. ( $p < 0.05$ ). They came to the conclusion that this morbidity is an effective treatment to reduce macular thickening due to diffused diabetic macular edema, as well as venous occlusion associated macular edema, and could potentially result in an increase in visual acuity, at least in the short term. In order to demonstrate its usefulness over the long run, additional research and monitoring are needed. After three unsuccessful intravitreal bevacizumab injections, a recent study<sup>10</sup> agreed with the hypothesis that intravitreal triamcinolone reduces central macular thickness (CMT) and helps to improve VA when compared postoperative data with pre-operative findings.

Intravitreal triamcinolone acetonide injection was found safe and effective in the long-term therapy of macular edema in 13 patients (13 eyes) with retinal vein blockage and macular edema, according to Patel PJ<sup>11</sup> in their prospective, interventional case series of 13 patients (13 eyes) (CRVO, HRVO, or BRVO). Eight eyes (62 percent) showed improvement in visual acuity and macular thickness 1-3 months after injection, according to their findings. Macular edema recurred in all eight eyes, and five of them had repeat injections, 3 cases refused for another shot. After the second injection, there was no improvement in visual acuity or OCT macular thickness, with visual acuity returning to baseline levels at one year. The initial injection failed to activate three eyes (23%). (no improvement in macular thickness or visual acuity). A rise in intraocular pressure was found in seven of the patients (54 percent), with six (46 percent) needing therapy. According to the researchers, intravitreal injection of triamcinolone acetonide is beneficial for treating macular edema caused by retinal vein obstruction in the short term, enhancing visual acuity and macular thickness.

An injection of triamcinolone acetonide intravitreally improved vision and lowered intraocular inflammation among patients suffering from several kinds of noninfectious uveitis, including sympathetic ophthalmia, according to Jonas JB<sup>12</sup>. They suggested that intravitreal triamcinolone could be beneficial as an angiostatic therapy for eyes that had iris neovascularization as well as proliferative ischemic retinopathies. They also suggested that the intravitreal triamcinolone injection be repeated if the patient experienced an improvement in visual acuity following the treatment. It is likely that the dosage that was administered plays a

role in determining how long the effects of a single intravitreal injection of triamcinolone last, which can range anywhere from two months to nine months.

Lin JM<sup>13</sup> in their non-comparative, found that intravitreal anti-VEGF injections were more effective than intravitreal examined the clinical results of posterior sub-Tenon (PST) injections of triamcinolone acetonide (TA) in the early treatment of severe cystoid macular edema (CME) in patients with central retinal vein blockage (CRVO). At 1, 3, 6, and 9 months of follow-up, researchers discovered a significant improvement in VA. VA progress at 1,4,6, and 9 months of follow-up. Jonas JB<sup>14</sup>, also supported this modality for an effective management.

## CONCLUSION

Administration of triamcinolone acetonide (TA) intravitreal inj. is an effective modality for the treatment of diabetic macular edema, and this treatment may lead to an improvement in visual acuity.

## REFERENCES

- Browning, David J; Stewart, Michael W1.; Lee, Chong Diabetic macular edema, Indian Journal of Ophthalmology: December 2018;66:1736-50 doi: 10.4103/ijo.IJO\_1240\_18
- Browning DJ, Stewart MW, Lee C. Diabetic macular edema: Evidence-based management. Indian J Ophthalmol. 2018 Dec;66(12):1736-1750. doi: 10.4103/ijo.IJO\_1240\_18. PMID: 30451174; PMCID: PMC6256891.
- Graue-Hernandez EO, Rivera-De-La-Parra D, Hernandez-Jimenez S, et al Prevalence and associated risk factors of diabetic retinopathy and macular oedema in patients recently diagnosed with type 2 diabetes BMJ Open Ophthalmology 2020;5:e000304. doi: 10.1136/bmjophth-2019-000304
- Shaikh DG, Kalhor FA, Shaikh SP. The Frequency of Diabetic Macular Edema and its Systemic Risk Factors: A Cross-Sectional Study. PJMHS 2022;16:744-9
- Nguyen QD, Tatlipinar S, Shah SM. Vascular endothelial growth factor is a critical stimulus for diabetic macular edema. Am J Ophtalmol 2006;142:961-9
- Sorrentino FS, Bonifazzi C, Parmeggiani F (2021) Diabetic macular edema: Safe and effective treatment with intravitreal triamcinolone acetonide (Tairfoal). PLoS ONE 16(10): e0257695. <https://doi.org/10.1371/journal.pone.0257695>
- Ishaq N. Role of intravitreal triamcinolone acetonide injection in treating refractory diabetic macular edema. Al-Shifa J Ophthalmol (ASJO) 2005;1:30-3
- Gillies MC, Sutter FK, Simpson JM, Larsson J, Ali H, Zhu M. Intravitreal triamcinolone for refractory diabetic macular edema: two-year results of a double masked, placebo controlled, randomized clinical trial. Ophthalmology 2006;113:1533-8
- Tewari HK, Sony P, Chawla R, Garg SP, Venkatesh P. Prospective evaluation of intravitreal triamcinolone acetonide injection in macular edema associated with retinal vascular disorders. Eur J Ophthalmology 2005;15:619-26
- Sugra, U., Gul, A., Habib, K., Khan, Z., & Khan, O. Effect of intravitreal triamcinolone acetonide in refractory diabetic macular edema. PAFMJ 2021;71(5):1861-64. <https://doi.org/10.51253/pafmj.v71i5.5305>
- Patel PJ, Zaheer I, Karia N. Intravitreal triamcinolone acetonide for macular oedema owing to retinal vein occlusion. Eye (Lond) 2008;22:60-4
- Jonas JB, Kreissig I, Kampeter B, Degenring RF. Intravitreal triamcinolone acetonide for the treatment of intraocular edematous and neovascular disease. Ophthalmology 2004;101:113-20
- Lin JM, Chiu YT, Hung PT, Tasi YY. Early treatment of severe cystoids macular edema in central retinal vein occlusion with posterior sub-tenon triamcinolone acetonide. Retina 2007;27:180-9
- Jonas JB, Kreissig I, Degenring R. intravitreal triamcinolone acetonide for treatment of intraocular proliferative, exudative, and neovascular diseases. Prog Retin Eye Res 2005;24:587-611