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Protocol Adherence in Managing Diabetic Macular Edema at Eye Center in Surabaya

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Abstract: *Diabetes is one of burden disease worldwide due to its complications. Microvascular complications can be manifested in sight threatening conditions such as Diabetic Macular Edema. Treatments for Diabetic Macular Edema are varied which can be done by pan-retinal coagulation laser, done with intravitreal injection of anti-vascular endothelial growth factor (anti VEGF) or intravitreal injection of corticosteroid. There are many treatment protocols available according to American Academy of Ophthalmology such as Protocol I while in Indonesia intravitreal injection of anti VEGF is used as first line. This study uses descriptive method and quantitative data to show the treatment adherence to the available protocol. This study provides a descriptive overview of treatment patterns for diabetic macular edema (DME) at an eye center in Surabaya between January and December 2021. Among the 88 respondents who met the inclusion criteria, the majority (59.1%) received intravitreal corticosteroid injections, while 40.9% were treated with intravitreal anti-VEGF agents. The largest proportion of respondents was aged 60–69 years (36.4%), and male patients predominated overall (62.5%). In the anti-VEGF group, men constituted 56% of respondents, whereas in the corticosteroid group, men comprised 71%. In light of the findings, it is recommended that clinical practice at the study site be further aligned with evidence-based guidelines, particularly the American Academy of Ophthalmology (AAO) and Indonesian Society of Ophthalmologists (PERDAMI) protocols, which advocate intravitreal anti-VEGF agents as the first-line therapy for DME with visual impairment. Strengthening physician awareness of guideline-concordant care, improving patient access to anti-VEGF therapy, and addressing potential barriers such as cost and availability may help optimize treatment outcomes.*
Keywords: *Protocol Adherence, Diabetic Macular Edema, Anti Vegf, Corticosteroids*

Introduction

Diabetes mellitus (DM) is recognized as one of the most burdensome chronic diseases worldwide, owing to its high prevalence, progressive nature, and multifaceted complications. The global number of adults living with diabetes has surpassed 500 million and is projected to rise, making it a pressing public health challenge. Diabetes imposes a considerable health and economic burden, as it is strongly associated with increased risks of cardiovascular disease, renal failure, neuropathy, and ocular damage. Among its microvascular complications, diabetic retinopathy and especially diabetic macular edema (DME) are common causes of visual disability. DME arises from chronic hyperglycemia, which damages retinal microvasculature by disrupting endothelial tight junctions, promoting capillary leakage, and inducing inflammatory processes. These pathophysiological changes result in accumulation of extracellular fluid and thickening of the macula, the central part of the retina related for sharp vision. DME can develop earlier diabetic retinopathy and is a common cause of sight loss in adults, impacting daily life and productivity. Despite advances in anti-VEGF therapy, corticosteroids, and pan-retinal laser photocoagulation, DME remains a therapeutic challenge due to variable treatment response and frequent recurrences. The growing global diabetes burden and the disabling nature of DME highlight the critical need for effective preventive strategies, early detection programs, and multidisciplinary management approaches.

The management of diabetic macular edema (DME) has advanced substantially over the past decade, guided by high-quality evidence and international consensus. Effective treatment of DME not only aims to improve or preserve visual acuity but also to mitigate the disabling impact on patients' quality of life. The American Academy of

Ophthalmology (AAO), through its guidelines, recommends intravitreal anti-vascular endothelial growth factor (anti-VEGF) agents as the first choice for DME associated with vision impairment. Agents such as aflibercept, ranibizumab, and off-label bevacizumab have demonstrated superior efficacy in improving visual acuity and reducing central retinal thickness compared to laser photocoagulation in large randomized controlled trials. Among these, aflibercept may offer additional benefit in patients with worse baseline vision.

In patients who exhibit bad response to anti-VEGF therapy, in whom such treatment is contraindicated, intravitreal corticosteroids—such as dexamethasone intravitreal implants or triamcinolone acetonide—can be considered, acknowledging their higher risks of ocular hypertension and cataract formation. Focal or grid laser photocoagulation, once the mainstay of DME therapy, retains a role for non–center-involved DME or as adjunctive therapy in specific scenarios. Importantly, the AAO emphasizes the need for ongoing monitoring and individualized treatment plans, taking into account systemic disease control, treatment response, and patient preferences.

Similarly, the Indonesian Society of Ophthalmologists (PERDAMI) provides evidence-based recommendations adapted to the Indonesian context, where resource limitations and accessibility influence clinical decisions. PERDAMI also endorses anti-VEGF therapy as the preferred treatment for DME, supplemented by laser photocoagulation when appropriate. Corticosteroid therapy is reserved for refractory or specific cases, particularly when anti-VEGF agents are not feasible. Both guidelines underline the critical importance of optimal systemic management of diabetes, hypertension, and dyslipidemia in conjunction with ocular therapies to achieve the best functional and anatomical outcomes. These harmonized protocols reflect an integrated, multidisciplinary approach to DME, essential in addressing the growing burden of vision loss due to diabetes globally and regionally.

The landmark clinical trials summarized in Table 1 have substantially advanced our understanding of diabetic macular edema (DME) treatment and have informed contemporary clinical guidelines. Protocol I demonstrated that intravitreal ranibizumab combined with laser photocoagulation—whether administered immediately or deferred—produced superior visual outcomes compared with laser alone or corticosteroid-based therapies, establishing anti-VEGF agents as a cornerstone of DME management. The RISE and RIDE trials confirmed the efficacy of ranibizumab at both 0.3 mg and 0.5 mg dosages, achieving significant improvements in visual acuity (VA) compared with sham injections. Similarly, the VISTA and VIVID trials demonstrated that aflibercept, administered every 4 or 8 weeks, was markedly better than macular laser in improving best-corrected visual acuity (BCVA) and reducing retinal thickness, further consolidating part of anti-VEGF therapy.

Protocol T provided critical comparative data among ranibizumab, bevacizumab, and aflibercept, revealing that while all three agents were effective in mild DME, aflibercept was significantly superior in cases with more severe baseline VA loss, influencing agent selection in clinical practice. Conversely, Protocol V highlighted that in eyes with good baseline VA, initial observation or deferred therapy was not inferior to immediate aflibercept, supporting a more conservative approach in selected patients. Protocol U explored combination therapy, showing that adjunctive dexamethasone with

ranibizumab reduced retinal thickness but did not improve VA beyond ranibizumab alone. Finally, the MEAD study demonstrated that dexamethasone implants at both tested doses improved BCVA compared with sham, reinforcing their role as an alternative or adjunctive therapy.

Together, these studies reinforce the superiority of anti-VEGF agents as first choice treatment for DME, while highlighting the roles of corticosteroids and laser photocoagulation in specific clinical contexts, allowing for more tailored, patient-centered therapeutic strategies.

Methods

This study employed a descriptive quantitative design to explore and assess adherence to established treatment protocols for diabetic macular edema (DME) at a tertiary eye center in Surabaya, Indonesia. This study was conducted using cross sectional observational study in between January 2021 and December 2021.

The study population comprised all patients diagnosed with DME, based on clinical and optical coherence tomography (OCT) findings, who received treatment at the center during study. Inclusion criteria were adults aged ≥18 years with documented DME and at least one completed treatment session. Patients with incomplete medical records or coexisting ocular diseases that could confound the assessment of treatment adherence were excluded.

Data were collected retrospectively from electronic medical records, including demographic variables (age, sex), clinical characteristics (baseline visual acuity, OCT findings), and details of treatment administered. Adherence was defined as the degree to which the administered treatment aligned with the guidelines of the American Academy of Ophthalmology (AAO) and the Indonesian Society of Ophthalmologists (PERDAMI), specifically regarding choice of therapy (e.g., anti-VEGF, corticosteroids, laser), timing of intervention, and follow-up intervals. The inclusion criteria are determined by patients over 18 years of age, patients with diabetic retinopathy and Type 1 or Type 2 diabetes mellitus who had received diabetes management therapy within the 3 months preceding the study period and were deemed stable, best-corrected visual acuity (BCVA) on the Snellen chart between 6/9 and 2/60 (0.67–0.003), patients with visual impairment due to proliferative diabetic retinopathy and DME, not attributable to other causes. While the exclusion criteria are comorbid conditions such as stroke, presence of active inflammation or infection in either eye, uncontrolled glaucoma in either eye (intraocular pressure >24 mmHg despite treatment), systolic blood pressure >160 mmHg or diastolic blood pressure >100 mmHg, presence of untreated hypertension, or changes in antihypertensive medication within the past 3 months. The minimum size of sample for the study uses Slovin formula are 88 respondents. The data were tabulated and analysed using descriptive statistics. Frequencies, proportions, means, and standard deviations were calculated as appropriate. Adherence rates were expressed as percentages of cases meeting protocol criteria

Results and Discussion

Between January and December 2021, 88 respondents who passed the inclusion criteria were selected in this study. Of these, 36 respondents (40.9%) received intravitreal

anti-VEGF injections, while 52 respondents (59.1%) were treated with intravitreal corticosteroid injections.

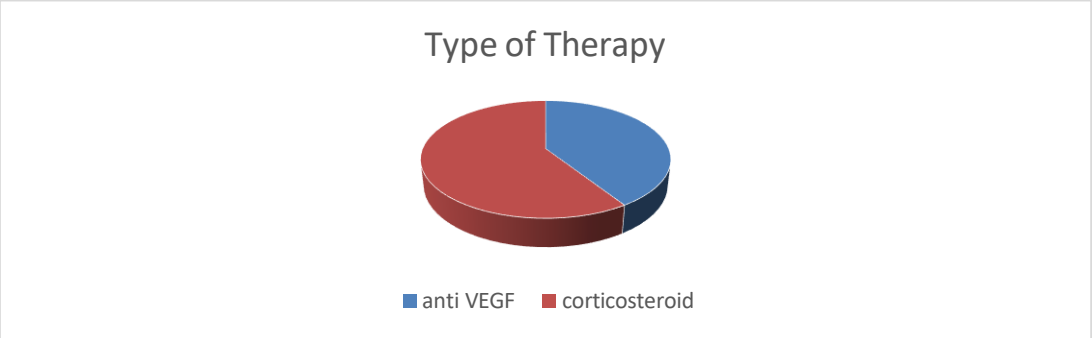

Chart 1: Type of Therapy

The age distribution of the respondents was as follows: 14 respondents (15.9%) were aged 40–49 years old, 17 respondents (19.3%) were aged 50–59 years old, 42 respondents (47.7%) were aged 60–69 years old, and 15 respondents (17.1%) were aged over 70 years old.

Age group	Number of respondents	Percentage
40-49 years old	14	15,9%
50-59 years old	17	19,3%
60-69 years old	42	47,7%
70 years old	15	17,1%

Table 1: Age distribution of respondents

The sex distribution of the respondents was as follows: 52 respondents (62,5%) were men and 33 respondents (37,5%) are women. From the group that received intravitreal anti-VEGF injections are 20 respondents (56%) are men and 16 respondents (44%) are women. From the group that received intravitreal corticosteroid injections are 37 respondents (71%) and 15 respondents (29%) are women.

Type of therapy	Men with percentage	Women with percentage
Anti VEGF	20 (56%)	16 (44%)
Corticosteroid	37 (71%)	15 (29%)

Table 2: Type of therapy and sex distribution

This study provides a descriptive overview of treatment for diabetic macular edema (DME) at eye center in Surabaya between January and December 2021. Among the 88 respondents who met the inclusion criteria, the majority (59.1%) received intravitreal corticosteroid injections, while 40.9% were treated with intravitreal anti-VEGF agents. The largest proportion of respondents was aged 60–69 years (36.4%), and male patients predominated overall (62.5%). In the anti-VEGF group, men constituted 56% of respondents, whereas in the corticosteroid group, men comprised 71%.

Conclusion

When interpreted in light of established guidelines, these findings suggest a divergence from the American Academy of Ophthalmology (AAO) and the Indonesian Society of Ophthalmologists (PERDAMI) recommendations, which endorse anti-VEGF agents as the first choice for DME with visual impairment due to their superior efficacy in better visual acuity and diminish retinal thickness. Corticosteroids are generally

reserved for refractory cases, contraindications to anti-VEGF therapy, or specific clinical scenarios.

The observed predominance of corticosteroid use (59.1%) in this study may reflect contextual factors such as treatment accessibility, patient comorbidities, physician preference, or economic considerations, particularly in a real-world Indonesian setting. Overall, these results underscore the importance of aligning clinical practice with evidence-based protocols to optimize outcomes in DME management, while also considering individual patient characteristics and local healthcare resources. Further investigation is warranted to explore the reasons behind treatment selection and to assess its impact on clinical outcomes.

Recommendation

In light of the findings, it is recommended that clinical practice at the study site be further aligned with evidence-based guidelines, particularly the American Academy of Ophthalmology (AAO) and Indonesian Society of Ophthalmologists (PERDAMI) protocols, which advocate anti-VEGF agents as the first choice for DME with visual impairment. Strengthening physician awareness of guideline-concordant care, improving patient access to anti-VEGF therapy, and addressing potential barriers such as cost and availability may help optimize treatment outcomes. Additionally, implementing regular clinical audits and educational interventions could promote adherence to standardized treatment pathways. This study has several limitations. First, its descriptive design and reliance on retrospective medical record data limit the ability to establish causal relationships or assess treatment effectiveness. Second, potential confounders such as baseline visual acuity, duration of diabetes, systemic control of comorbidities, and patient preferences were not analyzed, which may influence treatment selection. Third, the findings are based on a single site and may not be common to other settings with different patient populations or healthcare resources. Future studies should incorporate prospective designs, include clinical outcomes, and explore the underlying factors driving deviations from established treatment guidelines.

Limitations

This study has several limitations that need to be addressed. The study has conducted in one study location and the size of samples are limited and incomplete due to economic reasons from the respondents which may be challenging in representing the protocol adherence. Although the author agrees on the reliability of the data representation is limited but it can shows the picture of how the therapy is choosen based on several considerations. This study needs to be done more in different study locations all over Indonesia and needs to be continued with focus group discussion with the provider and the stakeholders in the hospital.

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