Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

A STUDY ON TO EVALUATE THE EFFICACY OF ANTI- VASCULAR ENDOTHELIAL GROWTH FACTOR THERAPY IN NEOVASCULAR AGE-RELATED MACULAR DEGENERATION AT TERTIARY CARE CENTRE OF JHARKHAND: A RETROSPECTIVE CROSS-SECTIONAL ANALYSIS.

Dr Priya Suman[1*],Dr Rahul Prasad[2], Dr Komal Soni[1], Dr Nitish Kumar Marshal[1]
[1]Junior Resident Department of Ophthalmology, RIO RIMS, Ranchi
[2]Additional Professor, Department of Opthalmology, RIO RIMS, Ranchi

Abstract

Background

The most common kind of age-related macular degeneration (ARMD) in the elderly is neovascular ARMD. Anomalies of the capillaries under the retina are the hallmarks of this condition. A well-established method for controlling neovascular ARMD is anti-VEFG (vascular endothelial growth factor) treatment, which blocks the formation of aberrant blood vessels.

Objectives

To study the efficacy of antiVEGF therapy in Neovascular ARMD and determine the effects of anti-VEGF therapy on central retinal thickness, visual acuity, leakage, and retinal morphology.

Methods

A retrospective cross-sectional study was conducted in the ophthalmology department over 12 months from January 2024 to December 2024 involving 50 patients with neovascular ARMD and a minimum of three months of anti-VEFG treatment were included. Ranibizumab, bevacizumab, or aflibercept were the drugs given to the patients. The data was gathered by measuring visual acuity with a Snellen chart, measuring central retinal thickness with optical coherence tomography (OCT), and evaluating retinal leakage with fluorescein angiography. Statistical analysis was conducted using paired t-tests, with a significance level of p-value < 0.05.

Results

Retinal morphology and visual acuity both showed notable improvements. A decrease in macular edema was indicated by an average reduction of 65 µm in central retinal thickness and an improvement of 0.18 in visual acuity on the Snellen scale. Compared to 80% at baseline, only 24% of patients exhibited leakage after treatment, according to fluorescein angiography, indicating a substantial decrease in retinal leakage.

Conclusion

Patients suffering from neovascular ARMD report marked improvements in visual acuity and retinal morphology after receiving anti-VEFG therapy. Patients with neovascular ARMD may be able to keep their eyesight with the help of anti-VEFG medications, according to the results.

Recommendation

There should be routine incorporation of anti-VEGF therapy as a frontline intervention for neovascular ARMD in tertiary and secondary healthcare settings across India.

Keywords: Anti-VEGF therapy, neovascular ARMD, visual acuity, retinal morphology, efficacy.
Submitted: 2025-04- 15 Accepted: 2025-05-12 Published: 2025-06-01

Corresponding Author
Dr Priya Suman
Email: **prsuman12@gmail.com**
Junior Resident, Department of Opthalmology, RIO RIMS Ranchi

Introduction

Neovascular age-related macular degeneration is a leading cause of permanent vision loss in the elderly, especially those over 50. This progressive disease causes leakage, scarring, and irreversible central vision loss due to an abnormal blood vessel network beneath the retina [1]. ARMD damages the macula, which provides sharp, detailed vision, affecting reading, driving, and face recognition [2]. Dry ARMD does not involve new blood vessels, while wet ARMD does. Unlike dry ARMD, which is the most common and slowly progressing form, neovascular ARMD is more aggressive and causes rapid vision loss [3]. CNV causes hemorrhages and macular edema by developing abnormal blood vessels. These complications impair retinal function and cause central vision loss. Neovascular ARMD causes devastating effects on daily life and quality of life making it a public

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

health issue [4]. Anti-VEGF therapy has revolutionized neovascular ARMD treatment. Neovascular ARMD is now treated with anti-VEFG agents like aflibercept, ranibizumab, and bevacizumab. Angiogenesis protein VEFG is strongly linked to neovascular ARMD [5]. These treatments reduce abnormal blood vessel growth and leakage by blocking VEFG. This stabilizes or improves vision [6]. Anti-VEFG therapy is a game-changer for wet ARMD treatment, improving retinal damage, macular edema, and visual acuity [7]. Clinical trials like MARINA, ANCHOR, and CATT show that monthly anti-VEFG injections can stop disease progression and restore some vision. As the gold standard for treating neovascular ARMD, anti-VEFG therapy is used worldwide [8].

Anti-VEFG agents have been extensively studied, but their long-term effects, optimal dosing, and clinical impact remain unknown. Large-scale, multicenter clinical trials show anti-VEFG therapy works, but more research is needed in smaller, resource-constrained settings [9]. Due to the country's aging population and rising lifestyle-related diseases, many Indians have ARMD. Advanced therapies like anti-VEFG may be scarcer in this country. Clinical outcomes in India may vary due to healthcare infrastructure, socioeconomic status, and comorbidities [10]. Because anti-VEFG therapy response and tolerability vary by ethnicity and region, regional studies are needed better to understand its therapeutic utility in India [11]. With this background, we investigated whether anti-VEFG treatment improves visual acuity and retinal structure in neovascular ARMD patients at a tertiary eye care center in Jharkhand. This year-long study will follow neovascular ARMD patients to determine the effects of anti-VEFG treatment. Wet ARMD patients taking anti-VEFG medication are the study population [12].

This retrospective cross-sectional study on anti-VEFG therapy's clinical efficacy in India could inform treatment recommendations, patient care, and healthcare policy. ARMD is becoming more common in developing nations like India due to an aging population, changing lifestyles, and rapid urbanization. This research is essential for filling the knowledge gap about treatment outcomes, patient experiences, and local healthcare challenges in managing neovascular ARMD. Anti-VEFG therapy regional efficacy studies in India are scarce. Understanding how Jharkhand patients respond to anti-VEFG therapy can improve future treatment strategies and patient care in similar regions. Standardized Snellen charts will measure visual acuity at baseline and follow-up visits to objectively assess vision changes over the 12-month treatment. Because optical coherence tomography (OCT) imaging can clearly show the macula and all retinal layers, we can measure macular edema, central retinal thickness, and other structural changes. It will help us understand retinal health. Anti-VEFG therapy must be evaluated structurally and visually to appreciate its effects fully.

This study will add evidence of anti-VEFG therapy's efficacy in resource-constrained Jharkhand. Additionally, clinicians will have useful data for treatment decisions. The study's findings may impact healthcare policy in India, where anti-VEFG treatment costs and availability are concerns. Due to the rising prevalence of age-related eye diseases like ARMD, treatment strategies, patient access, and eye care program viability must be optimized. This research aims to improve the quality of life for Indian neovascular ARMD patients by informing public health strategies and advocating for better treatment access.

Objectives

- This study examines anti-VEFG treatment's clinical efficacy and role in Indian ophthalmology and public health.
- This study aims to determine if anti-VEFG treatment improves neovascular AMD patients' visual acuity and retinal structure.
- This study will evaluate anti-VEFG agents' efficacy, injection frequency, patient compliance, and the impact of comorbidities like diabetes and hypertension.

Methods

Study Design

This retrospective cross-sectional study examined anti-VEFG therapy in a tertiary eye care center in Jharkhand in patients with neovascular ARMD. We chose a retrospective design to analyze patient records from the past year and assess treatment efficacy. This study design could replace prospective randomized trials as the gold standard for real-world efficacy assessment in clinical settings where time or money is limited. The cross-sectional study examined therapeutic efficacy in patients who had completed at least three months of anti-VEFG treatment.

Study Setting

The study was conducted in a tertiary eye care center in Jharkhand Medical. Since the hospital sees patients from urban and rural areas nationwide, it provides a good cross-section of neovascular AMD patients. The diverse cohort makes the study's findings applicable to the region's larger population.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

Sample Size

Researchers determined the sample size during the 12-month study from January 2024 to December 2024 by sampling 50 patients who met the inclusion criteria. Data collection and patient follow-up were feasible with 50 patients for statistical analysis. This study's sample size is large enough to detect statistically significant changes in retinal structure and visual acuity, supporting previous ARMD anti-VEFG research.

Inclusion Criteria

Age ≥ 50 years

Diagnosis of neovascular ARMD

Treated with Anti-VEGF therapy for at least 3 months

Exclusion Criteria

- Other retinal diseases
- History of ocular surgery or trauma
- Non-adherence to treatment
- Pregnancy or breastfeeding

Data Collection

The Snellen chart, a common visual acuity test, was used. A patient's best achievable vision at 20 feet is used to calculate their Snellen chart visual acuity. Anti-VEFG treatment was measured by central retinal thickness and macular edema reduction. Baseline fluorescein angiography confirmed neovascular ARMD and assessed abnormal blood vessel leakage. By injecting fluorescein into the bloodstream, this imaging method uses retinal vasculature. We recorded leakage and neovascularisation to aid treatment decisions.

Statistical Analysis

Data from anti-VEFG treatment were analyzed using statistical tools. The main indicators of success were changes in central retinal thickness and visual acuity over the year. The paired t-test was used to compare baseline and follow-up visual acuity and retinal thickness. A p-value below 0.05 indicated statistical significance. Descriptive statistics (mean, standard deviation) summarised patient demographics, baseline characteristics, and treatment responses.

Results

Table 1: Patient Demographics

Demographic Variable	Category	n (%)
Age (mean ± SD)	50-60 years	20 (40%)
	61-70 years	15 (30%)
	71-80 years	10 (20%)
	>80 years	5 (10%)
Gender	Male	30 (60%)
	Female	20 (40%)
Baseline Visual Acuity	20/40 or better	8 (16%)
	20/60 to 20/200	30 (60%)
	Worse than 20/200	12 (24%)

Table 2: Visual Acuity Outcomes

Measure	Pre-Treatment	Post-Treatment	Mean Improvement	p-value
Visual Acuity	0.68 ± 0.15 (Snellen)	0.50 ± 0.20 (Snellen)	+0.18	<0.05

Treatment with anti-VEFG resulted in a marked enhancement of visual acuity. The statistical significance of the improvement in Snellen visual acuity was demonstrated by the p-value of less than 0.05, which showed an average improvement of 0.18.

Table 3: Retinal Morphology

Measure	Pre-Treatment	Post-Treatment	Mean Change	p-value
Central Retinal Thickness (µm)	290 ± 45	225 ± 40	-65 µm	<0.01
Leakage (Fluorescein Angiography)	Present in 40 (80%)	Present in 12 (24%)	-56%	<0.05

A significant change in central retinal thickness was observed after treatment, with an average reduction of 65 µm and a p-value of less than 0.01. Anti-VEFG therapy reduced leakage in 56% of patients, from 80% at baseline to 24% after treatment, with a p-value of less than 0.05.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

Statistical Findings

Outcome	Test Used	p-value	Significance
Visual Acuity	Paired t-test	<0.05	Statistically significant improvement
Central Retinal Thickness	Paired t-test	<0.01	Statistically significant reduction in thickness
Leakage Reduction	Chi-square test	<0.05	Statistically significant reduction in leakage

Statistically significant results were observed in the paired t-tests for visual acuity and central retinal thickness, with p-values of less than 0.05 and less than 0.01, respectively. Supporting the effectiveness of anti-VEFG therapy in improving retinal structure and function, the chi-square test for leakage reduction demonstrated a significant decrease in fluorescein leakage with a p-value of less than 0.05.

Discussion

Key Results

The present retrospective cross-sectional study conducted at a tertiary eye care center in Jharkhand aimed to evaluate the clinical efficacy of anti-VEGF therapy in patients with neovascular age-related macular degeneration (ARMD), and the findings revealed statistically significant improvements in key ophthalmic parameters. Notably, visual acuity improved by an average of 0.18 on the Snellen scale ($p < 0.05$), central retinal thickness was reduced by 65 µm ($p < 0.01$), and the percentage of patients with fluorescein leakage decreased from 80% to 24% ($p < 0.05$), indicating strong therapeutic efficacy over just three months of treatment. These outcomes align well with the primary objective of assessing efficacy, as well as the secondary objectives of evaluating changes in retinal morphology and leakage.

Interpretation

The visual acuity gain, although numerically moderate, is functionally relevant as it contributes to improved ability in daily visual tasks such as reading and recognizing faces. The marked anatomical improvement, evidenced by the reduction in retinal thickness and leakage, suggests a resolution of macular edema, a hallmark of disease activity in wet ARMD. These outcomes confirm that anti-VEGF therapy not only halts but also reverses some of the pathological processes in neovascular ARMD. While these results align broadly with global clinical trial data such as MARINA and ANCHOR, our findings are particularly noteworthy for being derived from a real-world, resource-constrained setting in India. It is important to interpret the slight differences in efficacy compared to global data cautiously, as factors such as treatment delay, inconsistent follow-up, and variability in drug selection (bevacizumab, ranibizumab, or aflibercept) may account for discrepancies. Nonetheless, this study demonstrates that even with such constraints, anti-VEGF therapy produces clinically meaningful improvements in Indian patients.

Generalizability

The inclusion of patients from both rural and urban regions enhances the representativeness of the findings for the broader population of Jharkhand. However, the study's generalizability is limited by its single-center design, relatively small sample size (n=50), and short duration of follow-up. These factors restrict the ability to extrapolate results to other Indian states or national treatment outcomes. Nevertheless, the demographic diversity of the patient population and the real-world clinical setting provides a valuable preliminary understanding of treatment effectiveness in low-resource environments. Given that healthcare infrastructure, patient education, and treatment affordability vary widely across India, further multicenter studies are warranted to confirm these results in other regions and contexts.

Recommendations

Based on the outcomes, the study strongly recommends the routine incorporation of anti-VEGF therapy as a frontline intervention for neovascular ARMD in tertiary and secondary healthcare settings across India. The findings highlight the need for early diagnosis and prompt initiation of therapy to prevent irreversible vision loss. Routine use of optical coherence tomography (OCT) and fluorescein angiography is recommended for monitoring treatment response and guiding injection intervals. Healthcare practitioners should consider tailoring treatment frequency based on individual disease activity and patient tolerance. Additionally, public health authorities should prioritize funding for anti-VEGF therapies and diagnostic equipment, particularly in under-resourced regions. Training programs for ophthalmologists in rural areas and patient education initiatives about the benefits of early treatment and compliance could further improve outcomes. Future guidelines should explore the feasibility of treat-and-extend or PRN (as-needed) regimens to reduce patient burden while maintaining therapeutic gains.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

Implications for Clinical Practice

The clinical implications of this study are substantial. The significant improvements in visual function and anatomical structure validate the use of anti-VEGF agents even outside major urban centers. The data support a structured clinical pathway for neovascular ARMD involving early imaging, regular injections, and systematic follow-up. These findings can assist clinicians in treatment planning and patient counseling, especially in resource-limited environments where treatment options are often restricted. Moreover, the documented reduction in leakage and edema supports the use of imaging modalities not just at diagnosis but also throughout the treatment course, to personalize care and adjust therapeutic intervals. The study underscores the necessity of multidisciplinary approaches that integrate clinical ophthalmology with healthcare policy, logistics, and education to improve visual health outcomes in the aging Indian population.

Limitations

Despite its strengths, the study has several limitations that must be acknowledged. The retrospective design limits causal inference and introduces potential biases such as incomplete data collection and selection bias. The sample size of 50 patients, although sufficient for statistical analysis, may not adequately capture variability in treatment response. The three-month follow-up period limits insights into the long-term sustainability of visual and anatomical improvements. Additionally, the study did not stratify outcomes based on patient comorbidities (e.g., diabetes, hypertension), socioeconomic status, or treatment adherence, all of which could influence therapeutic efficacy. The use of multiple anti-VEGF agents without subgroup analysis may also have introduced variability in outcomes. Lastly, the single-center scope limits the study's applicability to other geographic regions with different healthcare infrastructures.

Conclusion

A study to evaluate the efficacy of anti-VEGF therapy in Neovascular ARMD at a tertiary eye care center in Jharkhand, examined how anti-VEFG therapy improved visual acuity and retinal structure in neovascular ARMD patients. The results showed that anti-VEFG agents reduced central retinal thickness and leakage and enhanced visual acuity, suggesting they may treat neovascular ARMD. These findings support the idea that anti-VEFG therapy should be the first treatment for wet ARMD because it can stabilize or improve vision. Clinical practice is affected by these findings. Neovascular ARMD requires anti-VEFG therapy. Treatment targets vascular endothelial growth factor, which causes abnormal retinal blood vessel growth. After early diagnosis and treatment, visual acuity and retinal morphology improve, preventing or slowing vision loss. OCT and fluorescein angiography are needed to assess treatment efficacy and guide future treatment. To confirm these findings and better understand the long-term effects of anti-VEFG therapy in neovascular ARMD, multicenter prospective studies with larger samples are needed. Explore the effects of different injection frequencies and individualized treatment regimens to improve treatment strategies, outcomes, and patient visits. Further research into this potentially blinding condition may improve management guidelines and reveal the best treatments.

Acknowledgment

The Author would like to thank all the staff members of RIMS Ranchi for their collective support For everything. The author would like to thank all the coauthors for giving support in writing collecting and proofreading this work.

Lists of abbreviations

ARMD- Age related degeneration

VEFG- vascular endothelial growth factor

OCT- Optical coherence tomtomograpy

Source of Funding

The author received no finanacial add or funding for this research work.

Conflict of interest

The Author declares no conflict of interest.

Author Biography

Dr Priya Suman is working as a junior Resident in the Department of ophthalmology RIO RIMS Ranchi

Dr Rahul Prasad is working as an Associate Professor in the Department of ophthalmology RIO RIMS Ranchi.

Dr Komal Soni is working as a junior Resident in the Department of ophthalmology RIO RIMS Ranchi.

Dr Nitish Kumar Marshal is working as a junior Resident in the Department of ophthalmology at RIO RIMS Ranchi.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

Author Contribution

Dr Priya Suman– Data collection, drafting and interpretation and finalising and final editing of this manuscript.

Dr Rahul Prasad – Drafting supervise and proofread of this manuscript.

Dr Komal Soni- Finalize, conceptualized, briefings corrections and final editing this manuscript.

Reference

1.Khanna, S., Komati, R., Eichenbaum, D. A., Hariprasad, I., Ciulla, T. A., & Hariprasad, S. M. (2019). Current and upcoming anti-VEGF therapies and dosing strategies for the treatment of neovascular AMD: a comparative review. BMJ open ophthalmology, 4(1), e000398.
https://doi.org/10.1136/bmjophth-2019-000398
PMid:31909196 PMCid:PMC6936465

2. Bakri, S. J., Thorne, J. E., Ho, A. C., Ehlers, J. P., Schoenberger, S. D., Yeh, S., & Kim, S. J. (2019). Safety and efficacy of antivascular endothelial growth factor therapies for neovascular age-related macular degeneration: a report by the American Academy of Ophthalmology. Ophthalmology, 126(1), 55-63.
https://doi.org/10.1016/j.ophtha.2018.07.028
PMid:30077616

3. Mettu, P. S., Allingham, M. J., & Cousins, S. W. (2021). Incomplete response to Anti-VEGF therapy in neovascular AMD: Exploring disease mechanisms and therapeutic opportunities. Progress in retinal and eye research, 82, 100906.
https://doi.org/10.1016/j.preteyeres.2020.100906
PMid:33022379 PMCid:PMC10368393

4. Rosenberg, D., Deonarain, D. M., Gould, J., Sothivannan, A., Phillips, M. R., Sarohia, G. S., ... & Chaudhary, V. (2023). Efficacy, safety, and treatment burden of treat-and-extend versus alternative anti-VEGF regimens for nAMD: a systematic review and meta-analysis. Eye, 37(1), 6-16.
https://doi.org/10.1038/s41433-022-02020-7
PMid:35396574 PMCid:PMC9829919

5. Parravano, M., Costanzo, E., Scondotto, G., Trifirò, G., & Virgili, G. (2021). Anti-VEGF and other novel therapies for neovascular age-related macular degeneration: an update. BioDrugs, 35(6), 673-692.
https://doi.org/10.1007/s40259-021-00499-2
PMid:34655434

6. Yin, X., He, T., Yang, S., Cui, H., & Jiang, W. (2022). Efficacy and Safety of Antivascular Endothelial Growth Factor (Anti-VEGF) in Treating Neovascular Age-Related Macular Degeneration (AMD): A Systematic Review and Meta-analysis. Journal of Immunology Research, 2022(1), 6004047.
https://doi.org/10.1155/2022/6004047
PMid:35465351 PMCid:PMC9033403

7. Sharma, D., Zachary, I., & Jia, H. (2023). Mechanisms of acquired resistance to anti-VEGF therapy for neovascular eye diseases. Investigative Ophthalmology & Visual Science, 64(5), 28-28.
https://doi.org/10.1167/iovs.64.5.28
PMid:37252731 PMCid:PMC10230445

8.Horner, F., Lip, P. L., Mohammed, B. R., Fusi-Rubiano, W., Gokhale, E., Mushtaq, B., & Chavan, R. (2021). Comparing the effectiveness of three different anti-VEGF treatment regimens for neovascular age-related macular degeneration: two years' real-world clinical outcomes. Clinical Ophthalmology, 1703-1713.
https://doi.org/10.2147/OPTH.S305141
PMid:33935487 PMCid:PMC8080302

9. Chakravarthy, U., Armendariz, B. G., & Fauser, S. (2022). 15 years of anti-VEGF treatment for nAMD: success or failure or something in between? Eye, 36(12), 2232-2233.
https://doi.org/10.1038/s41433-022-02153-9
PMid:35752715 PMCid:PMC9674845

10. Finger, R. P., Daien, V., Eldem, B. M., Talks, J. S., Korobelnik, J. F., Mitchell, P., ... & Carrasco, J. (2020). Antivascular endothelial growth factor in neovascular age-related macular degeneration-a systematic review of the impact of anti-VEGF on patient outcomes and healthcare systems. BMC Ophthalmology, 20, 1-14.
https://doi.org/10.1186/s12886-020-01554-2
PMid:32680477 PMCid:PMC7368708

11. Ma, H., Wei, H., Zou, C., Zhu, G., Gao, Q., Zhang, N., & Wang, B. (2023). Anti-VEGF Drugs in Age-Related Macular Degeneration: A Focus on Dosing Regimen-Related Safety and Efficacy. Drugs & Aging, 40(11), 991-1007.
https://doi.org/10.1007/s40266-023-01068-8
PMid:37863867

12. Matonti, F., Korobelnik, J. F., Dot, C., Gualino, V., Soler, V., Mrejen, S., ... & Kodjikian, L. (2022). Comparative effectiveness of intravitreal antivascular endothelial growth factor therapies for managing neovascular age-related macular degeneration: a meta-analysis. Journal of Clinical Medicine, 11(7), 1834.
https://doi.org/10.3390/jcm11071834
PMid:35407439 PMCid:PMC8999505

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1831
Original Article

Publisher details

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa