Original Article
DOI: https://doi.org/10.70749/ijbr.v3i6.1650

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Outcome of Yag Laser Vitreolysis in Symptomatic Vitreous Floaters at Tertiary Care Hospital Karachi

M. Asghar Rajani[1], Faisal Murtaza Qureshi[1], Mudassir Hilal[1], Burhan Abdul Majid Khan[1], Riaz Memon[1]

[1]Department of Ophthalmology, POB Eye Hospital, Karachi, Sindh, Pakistan.

ARTICLE INFO

Keywords: YAG laser vitreolysis, Vitreous Floaters, Visual Outcomes, Treatment

Correspondence to: M. Asghar Rajani
Department of Ophthalmology, POB Eye Hospital, Karachi, Sindh, Pakistan.
Email: asgharrajani110@gmail.com

Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 04-02-2025 Revised: 12-05-2025
Accepted: 01-06-2025 Published: 30-06-2025

ABSTRACT

Background: Vitreous floaters are a common ocular condition that can significantly impair quality of life. Nd:YAG vitreolysis is a minimally invasive procedure that has shown promise as a treatment for symptomatic floaters. **Objective:** To assess the clinical outcomes of Nd:YAG vitreolysis in terms of symptom improvement, visual disturbance, and complications. **Methods:** A descriptive study was conducted at the Retina Clinic of POB Eye Hospital. The Nd:YAG procedure was performed by an experienced ophthalmologist fellow, and outcomes were assessed at 8 weeks post-treatment. Data analysis was performed using SPSS version 22.0. **Results:** Out of the 113 patients, 28% reported complete improvement, 48% had partial improvement, and 24% showed no improvement in floaters. Visual disturbance improved from a mean of 20/70 pre-treatment to 20/40 post-treatment in 70% of patients. Stratification by comorbidity revealed that patients without hypertension or diabetes mellitus had higher rates of complete improvement. One subject developed retinal detachment 1 week after the procedure, which was managed with pars plana vitrectomy, resulting in a restored visual disturbance of 6/9. **Conclusion:** Nd:YAG vitreolysis is an effective and safe treatment for symptomatic vitreous floaters, with most patients experiencing significant improvement in symptoms and visual disturbance. However, careful monitoring is required, as complications such as retinal detachment, though rare, can occur.

INTRODUCTION

Eye floaters are a common visual phenomenon experienced by many individuals, often characterized as small, dark specks or cobweb-like structures that appear to float in the field of vision. While typically harmless, some patients may experience persistent, symptomatic floaters that significantly impact their daily activities and quality of life. Age-related changes in the vitreous humor typically cause vitreous floaters, the gel-like substance that fills the back of the eye. With age, the vitreous humor can shrink, lose its gel-like consistency, and become more liquid. As a result, collagen fibers within the vitreous can clump together, creating small specks or strands that cast shadows on the retina, which are perceived as floaters. Although vitreous floaters are usually harmless and don't require treatment, they can sometimes be associated with more severe ocular conditions. Potential complications include Retinal tear or detachment: A sudden increase in the number of floaters, accompanied by flashes of light or a loss of peripheral vision, could be a sign of a retinal tear or detachment, which is a medical emergency and requires immediate attention. Vision impairment: In rare cases, a large or dense floater may obstruct the central field of vision, interfering with daily activities such as reading or driving,

Emotional distress: Persistent floaters can cause anxiety, frustration, or depression in some individuals, affecting their overall quality of life. Most floaters don't require treatment and may fade over time. However, if they significantly affect a person's quality of life, the following options can be considered: Vitreolysis: A minimally invasive outpatient laser procedure to vaporize floaters. Vitrectomy: A surgical procedure to remove the vitreous humor, reserved for severe cases.[3] A research by Gustavo D. Ludwig et al investigated the effectiveness and safety of Nd:YAG laser vitreolysis for treating symptomatic vitreous floaters. Their findings demonstrated a considerable 77% improvement in symptoms among participants who received the Nd:YAG laser treatment, compared to a 25% improvement in the control group. In a research carried out by Chirag P. Shah et al it was found that there was a 59.4% improvement in symptoms, which was consistent with the 54% improvement observed at the 6-month mark. In another study by Guilherme M. Nunes,et al showed a notable improvement in symptomatology was observed following the procedure.25% of the participants

experienced complete improvement, while a comparable percentage (37.5%) reported significant or partial improvement. Vitreous floaters can negatively impact a person's quality of life by causing visual disturbances, reduced visual disturbnace, and psychological distress. Assessing the outcomes of vitreolysis as a treatment option can provide valuable information to eye care professionals and patients in terms of its potential benefits, risks, and overall effectiveness in managing symptomatic floaters. By evaluating the success of vitreolysis in alleviating symptoms, researchers can identify possible areas for improvement, optimize the procedure, and provide evidence-based recommendations for its use in clinical practice.

Objective

To determine the outcome of Nd: Yag vitreolysis among patients with symptomatic floaters in tertiary Care hospital Karachi.

METHODOLOGY

This Descriptive study was conducted at Retina clinic POB Eye Hospital during September 2023 to August 2024. Data were collected through Non-probability consecutive sampling technique.

Sample Size

Sample size was calculated using openepi by taking following parameters
Taking complete improvement in symptoms = 25%
Margin of error: 8%
CI = 95%
Sample size = 113

Inclusion Criteria

- Adults aged 20 years or older.
- Presence of symptomatic vitreous floaters (as per operational definition)
- Willingness and ability to provide informed consent for the procedure and follow-up assessments.

Exclusion Criteria

- Eye conditions: Presence of retinal detachment, advanced glaucoma, macular edema, or any other significant ocular pathology that could impact the treatment outcome or safety.
- Intraocular inflammation: Active uveitis or other intraocular inflammatory conditions.
- Cataract: Significant cataracts that could interfere with the procedure or influence the treatment outcome.
- Refractive error: High myopia (more than -6 diopters) or other refractive errors that could increase the risk of retinal complications.
- Pregnancy: Pregnant or breastfeeding women.

Data Collection

After approval from ERC and CPSP, data were collected from patients who attended the Retina clinic of POB Eye Hospital and were selected for Nd: YAG vitreolysis and met the inclusion criteria. Patients were provided with a consent form, and a proforma was filled for assessment. Written consent was obtained from the patient by a qualified ophthalmologist. The purpose and benefits of the study were explained, and confidentiality was maintained. After a detailed history, an ophthalmic checkup, including visual disturbance, slit lamp examination, fundus examination with an indirect ophthalmoscope, and retinoscopy, was conducted. The procedure was explained to the patients. The Nd:YAG procedure was performed by an experienced ophthalmologist fellow of CPSP with 3 years of post-fellowship experience. All patients were assessed for the outcome of Nd:YAG vitreolysis as per the operational definition. To enhance precision and safety during laser delivery, the Volk Idrees Mid-Vitreous Specialty Slit Lamp Lens was utilized. This lens is specifically designed for mid-vitreous visualization, offering excellent magnification and depth perception. All patients were followed for 8 weeks to assess the outcome. All patients were followed under the supervision of an expert ophthalmologist fellow of CPSP with 3 years of post-fellowship experience. To overcome examiner bias, a single researcher performed the measurements, and the same eye was examined for each patient.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0. Mean ± Standard Deviation (SD) or median (IQR) was calculated for quantitative variables such as age and duration of symptoms. The normality of the data was assessed using the Shapiro-Wilk test. Categorical variables, including gender, eye examination, visual disturbance, residence, comorbidities (HTN, DM), and outcome (complete improvement/partial improvement/no improvement), were presented as frequencies and percentages. Stratification was done for age, gender, duration of symptoms, visual disturbance, and comorbidities. Post-stratification chi-square tests were applied. A p-value of ≤0.05 was considered statistically significant.

RESULTS

Data were collected from 113 patients with a mean age of 55.2 ± 9.4 years, with a slight male predominance (53%) and the majority of patients residing in urban areas (68%). Comorbidities were noted in a significant portion of the sample, with 36 percent having hypertension and 28 percent having diabetes mellitus. The mean duration of symptoms was 12.4 ± 4.8 months. Regarding lens status, 36.3 percent of the patients were pseudophakic while 63.7 percent were phakic.

Table 1

Baseline Characteristics of Study Participants

Characteristic	Value
Mean Age (years)	55.2 ± 9.4
Gender (Male)	53%
Gender (Female)	47%
Residence (Urban)	68%
Residence (Rural)	32%
Hypertension	36%
Diabetes Mellitus	28%
Mean Duration of Symptoms (months)	12.4 ± 4.8
Lens Status (Pseudophakic)	36.3% (41 patients)
Lens Status (Phakic)	63.7% (72 patients)

Following Nd:YAG vitreolysis, 28 percent of patients (32 individuals) experienced a complete improvement in floater symptoms, while 48 percent (54 patients) reported partial improvement and 24 percent (27 patients) showed no improvement. Visual disturbance improved in 70 percent of patients (79 individuals), which was

statistically significant with a p-value of 0.01. The overall treatment outcome in terms of symptom resolution did not reach statistical significance, with a p-value of 0.23.

Table 2

Treatment Outcomes and Improvement in Visual disturbance Following Nd:YAG Vitreolysis

Outcome	Number of Patients	Percentage (%)	p-value
Complete Improvement	32	28	
Partial Improvement	54	48	0.23
No Improvement	27	24	
Improved results in visual disturbance	79	70	0.01
No Significant Change in Visual disturbance	34	30	

Stratification of treatment outcomes revealed that patients without comorbidities had a higher rate of complete improvement (35%) compared to those with hypertension (24%) and diabetes mellitus (22%), with a statistically significant p-value of 0.03. Younger patients aged 60 years or below showed better outcomes, with 36% reporting complete improvement, compared to 20% in older patients, though this difference was not statistically significant (p = 0.12). Gender-based analysis indicated similar response rates between males and females, with no significant difference observed (p = 0.45).

Table 3

Stratification of Treatment Outcomes by Comorbidities, Age, and Gender

Factor	Complete Improvement (%)	Partial Improvement (%)	No Improvement (%)	p-value
No Comorbidity	35	45	20	
Hypertension	24	48	28	0.03
Diabetes Mellitus	22	49	29	
Age ≤ 60	36	48	16	
Age > 60	20	47	33	0.12
Male	29	49	22	
Female	28	47	25	0.45

Patients with pseudophakic eyes demonstrated better outcomes compared to phakic eyes, with 34% achieving complete improvement in symptoms versus 25% in phakic patients. Visual disturbnace improvement to 20/40 or better was observed in 76% of pseudophakic patients compared to 66% of phakic patients. Although these differences suggest a favorable trend for pseudophakic eyes, they were not statistically significant, with p-values of 0.09 and 0.07 respectively.

Table 4

Outcomes by Lens Status (Pseudophakic vs Phakic)

Lens Status	Complete Improvement (%)	Partial Improvement (%)	No Improvement (%)	Visual disturbance Improved (%)	No Visual Change (%)	p-value
Pseudophakic	34	49	17	76	24	0.09
Phakic	25	47	28	66	34	0.07

DISCUSSION

The findings of this study provide valuable insight into the effectiveness of Nd:YAG vitreolysis as a treatment for symptomatic vitreous floaters, particularly in the context of a tertiary care hospital setting in Karachi. Overall, the study demonstrated that Nd:YAG vitreolysis can offer a significant improvement in symptoms for a substantial proportion of patients, with 28% of participants experiencing complete resolution of floaters and 48% reporting partial improvement. Visual disturbance outcomes were particularly noteworthy, with 70% of patients showing improvement to 20/40 or better, a statistically significant finding (p = 0.01)[9]. This reinforces that beyond subjective symptom relief, Nd: YAG vitreolysis can deliver functional visual improvements. However, symptom improvement alone (p = 0.23) was not statistically significant, suggesting individual variability in patient-reported outcomes. Stratification by comorbidity revealed that patients without systemic illnesses had better outcomes. Specifically, 35% of patients without hypertension or diabetes achieved complete improvement, compared to 24% and 22% of patients with hypertension and diabetes, respectively (p = 0.03)[10]. This indicates that systemic vascular conditions may influence vitreous healing or responsiveness to laser energy, possibly due to compromised ocular microcirculation or structural changes in the vitreous. Age-wise, younger patients (≤60 years) showed better symptomatic improvement (36%) than those over 60 (20%), although the difference was not statistically significant (p = 0.12). This may be due to better vitreous clarity or fewer degenerative changes in younger eyes. No significant differences were observed based on gender, which is consistent with prior studies indicating that anatomical factors rather than biological sex determine treatment outcomes[11]. Importantly, pseudophakic patients demonstrated more favorable outcomes compared to phakic individuals. Complete symptom improvement was seen in 34% of pseudophakic eyes versus 25% in phakic eyes[12]. Additionally, 76% of pseudophakic patients experienced visual disturbnace improvement to 20/40 or better, compared to 66% in the phakic group. Though not statistically significant (p = 0.09 and 0.07), these trends suggest that the absence of a natural lens may improve visualization during the procedure, allow better laser delivery, and reduce light scatter enhancing overall treatment efficacy[13]. A retrospective study by Gustavo Ludwig et al. (2020) demonstrated even higher efficacy, with 77% of patients experiencing symptom resolution following treatment compared to only 25% in the control group. This parallels our result of 76% partial or complete improvement, adding external validity to our findings despite differing geographic and demographic profiles[14]. While the study provides valuable information about the outcomes of Nd:YAG vitreolysis in a clinical setting, several limitations should be acknowledged. First, the study design was descriptive, which limits the ability to establish causal relationships between patient characteristics and treatment outcomes. Additionally, the relatively short follow-up period of 8 weeks may not fully capture long-term outcomes and the potential for recurrence of floaters. Future studies with longer follow-up durations and

randomized controlled designs would provide stronger evidence for the efficacy of this treatment.

CONCLUSION

It is concluded that Nd: YAG vitreolysis is an effective and minimally invasive treatment option for symptomatic vitreous floaters, with a substantial proportion of patients experiencing complete or partial improvement in symptoms. The procedure resulted in a significant improvement in visual disturbance for the majority of patients, with 70% achieving a visual disturbance of 20/40 or better after 8 weeks. However, the presence of comorbidities such as hypertension and diabetes mellitus appeared to negatively impact the treatment outcomes, with patients without these comorbidities showing better results. While age did not have a significant effect on the overall outcome, younger patients tended to have a higher rate of complete improvement compared to older patients. No significant gender-based differences were observed in the treatment response.

REFERENCES

1. Sharma, P., Sridhar, J., & Mehta, S. (2015). Flashes and floaters. *Primary Care: Clinics in Office Practice*, *42*(3), 425-435. https://doi.org/10.1016/j.pop.2015.05.011
2. Kakulavarapu, S., Kiryakoza, L., & Sridhar, J. (2022). Complications of treatment for symptomatic vitreous floaters: A review. *International Ophthalmology Clinics*, *62*(3), 131-155. https://doi.org/10.1097/iio.0000000000000433
3. Broadhead, G. K., Hong, T., & Chang, A. A. (2020). To treat or not to treat: Management options for symptomatic vitreous floaters. *Asia-Pacific Journal of Ophthalmology*, *9*(2), 96-103. https://doi.org/10.1097/apo.0000000000000276
4. Ludwig, G. D., Gemelli, H., Nunes, G. M., Serracarbassa, P. D., & Zanotele, M. (2020). Efficacy and safety of Nd:YAG laser vitreolysis for symptomatic vitreous floaters: A randomized controlled trial. *European Journal of Ophthalmology*, *31*(3), 909-914. https://doi.org/10.1177/1120672120968762
5. Shah, C. P., & Heier, J. S. (2017). YAG laser Vitreolysis vs sham YAG Vitreolysis for symptomatic vitreous floaters. *JAMA Ophthalmology*, *135*(9), 918. https://doi.org/10.1001/jamaophthalmol.2017.2388
6. Nunes, G., Ludwig, G., Gemelli, H., Serracarbassa, P. D., & Zanotele, M. (2021). Long term evaluation of the efficacy and and safety of Nd:Yag laser Vitreolysis for symptomatic vitreous floaters. https://doi.org/10.21203/rs.3.rs-466147/v1
7. Ghoghari, M. K., Razzak, H., Kamil, Z., Rizvi, S. F., & Afsar, A. (2024). ND: YAG laser of Weiss ring for the treatment of symptomatic vitreous floaters in patients with posterior vitreous detachment. *Pakistan Journal of Ophthalmology*, *40*(4). https://doi.org/10.36351/pjo.v40i4.1848
8. Janeková, A., Veith, M., Fillová, D., & Janek, M. (2022). Laser Vitreolysis in patients with symptomatic vitreous floaters. *Czech and Slovak Ophthalmology*, *78*(6), 288-296. https://doi.org/10.31348/2022/28
9. Shah, C. P., & Heier, J. S. (2017). YAG laser Vitreolysis vs sham YAG Vitreolysis for symptomatic vitreous floaters. *JAMA Ophthalmology*, *135*(9), 918. https://doi.org/10.1001/jamaophthalmol.2017.2388
10. Hangshuai, Z., Yanhua, J., Yao, Z., Guangjin, Z., Hongyan, W., & Fanlian, C. (2024). Efficacy and safety of early YAG laser vitreolysis for symptomatic vitreous floaters: The study protocol for a randomized clinical trial. *Trials*, *25*(1). https://doi.org/10.1186/s13063-024-07924-1
11. Milston, R., Madigan, M. C., & Sebag, J. (2016). Vitreous floaters: Etiology, diagnostics, and management. *Survey of Ophthalmology*, *61*(2), 211-227. https://doi.org/10.1016/j.survophthal.2015.11.008
12. García, B. G., Orduna Magán, C., Alvarez-Peregrina, C., Villa-Collar, C., & Sánchez-Tena, M. Á. (2021). Nd:YAG laser vitreolysis and health-related quality of life in patients with symptomatic vitreous floaters. *European Journal of Ophthalmology*, *32*(2), 1143-1148. https://doi.org/10.1177/11206721211008036
13. Nunes, G., Ludwig, G., Gemelli, H., Serracarbassa, P. D., & Zanotele, M. (2021). Long term evaluation of the efficacy and and safety of Nd:Yag laser Vitreolysis for symptomatic vitreous floaters. https://doi.org/10.21203/rs.3.rs-466147/v1
14. Yang, H., Guo, L., Jia, G., Gong, X., Wu, Q., Zeng, R., Zhang, M., Ding, H., Fang, F., Zheng, H., Liu, X., Ge, Y., Yang, Y., & Lin, T. (2021). Treatment of nevus of Ota with 1064 nm picosecond Nd:YAG laser: A retrospective study. *Dermatologic Therapy*, *34*(6). https://doi.org/10.1111/dth.15152
15. Williams, N. M., Gurnani, P., Long, J., Reynolds, J., Pan, Y., Suzuki, T., Alhetheli, G. I., & Nouri, K. (2020). Comparing the efficacy and safety of Q-switched and picosecond lasers in the treatment of nevus of Ota: A systematic review and meta-analysis. *Lasers in Medical Science*, *36*(4), 723-733. https://doi.org/10.1007/s10103-020-03125-9
16. Ludwig, G. D., Richa, D., & Sabrosa, N. A. (2020). Outcomes of Nd:YAG laser vitreolysis for symptomatic vitreous floaters: A retrospective study. *International Journal of Retina and Vitreous*, 6, 55. https://doi.org/10.1186/s40942-020-00241-3