

Original Research Article

STUDY OF THE EFFECT OF ACETAZOLAMIDE ON MACULAR EDEMA IN PATIENTS OF RETINITIS PIGMENTOSA

Srishti Nagarajan¹, Sajan Dev kesar², Avinash Gupta³, Ajay gour⁴, Amod Kumar Saroj⁵, Pooja⁶

^{1,2}Assistant Professor, Department of Ophthalmology, Mahamaya Rajkiya Allopathic Medical College, Ambedkar Nagar, Uttar Pradesh India.

³Senior Medical Officer, Combined District Hospital, Chibramau Kannauj, Uttar Pradesh India.

⁴2nd year, Postgraduate trainee, JR-2, Mahamaya Rajkiya Allopathic Medical College Ambedkar Nagar, Uttar Pradesh India.

⁵Assistant Professor, Department of Pathology, MRA Medical College Ambedkar Nagar, Uttar Pradesh India.

⁶Assistant Professor, Department of OBG, MRA Medical College Ambedkar Nagar, Uttar Pradesh India.

Received : 25/08/2026
Received in revised form : 24/09/2026
Accepted : 06/10/2026

Corresponding Author:

Dr. Srishti Nagarajan,
Assistant Professor, Department of
Ophthalmology, Mahamaya Rajkiya
Allopathic Medical College, Ambedkar
Nagar, Uttar Pradesh India.
Email: srishti1594@gmail.com

DOI: 10.70034/ijmedph.2026.4.50

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (4); 333-338

ABSTRACT

Background: to compare changes in macular edema secondary to Retinitis Pigmentosa, after oral Acetazolamide 250mg BD given for a duration of three months.

Materials and Methods: The prospective observational study was carried out at the Regional Institute of Ophthalmology (M.D. Eye Hospital, Dr. Katju Road, Nakhas Kohna, Prayagraj) which is a tertiary care centre and one of the largest eye hospital in Prayagraj, after taking permission from ethical committee of M.L.N Medical College, Prayagraj.

Results: The Mean age of patients was 33.56±07.61 years. Male and female patients had mean age of 34.60±08.12 years and 31.50±06.38 years respectively. Mean visual acuity of all 30 patients at base line was 0.12±0.06 (decimal equivalent). Mean visual acuity (with pinhole) of all 30 patients at base line was 0.10±0.04 (decimal equivalent). The mean central macular thickness (micrometre) at baseline and at follow up. The mean central macular thickness(micrometre) at baseline and at follow up. there is no statistical significance in the difference between the mean visual acuity among the study subjects when the baseline visual acuity and the visual acuity at the end of 12 weeks are compared, thereby concluding that the change in visual acuity is variable. There is a statistically significant difference between the visual acuity (decimal equivalent) at baseline and at the end of 12 weeks (3rd month).

Conclusion: In our study, even though there is no statistical difference between number of male and female patients, but the number of male patients is definitely more than female patients. The severity of the disease increases with age. There is marked optic disc pallor, arterial attenuation in later stages as well with increasing age. Macular edema is one of the treatable causes of central vision loss in Retinitis Pigmentosa. Optical Coherence Tomography is one of the best investigative modality for assessing the retinal thickness.

Keywords: Retinitis Pigmentosa, Macular edema, Optical Coherence Tomography.

INTRODUCTION

Retinitis Pigmentosa is not a single entity, rather encompasses a group of inherited retinal dystrophies that cause progressive vision loss.^[1] Progressive vision loss significantly affects the ability to perform basic daily tasks, to maintain employment, and maintain independence. Consequently, most patients

will experience reduced quality of life, with a greater emotional and psychological impact than other conditions related to vision loss such as diabetic retinopathy or age-related macular degeneration. RP is also associated with a high level of career burden, arising from psychological and financial stress. With no current treatments to stop disease progression or restore vision, RP is considered incurable and is

associated with a high unmet need. Therapy is aimed at restricting degeneration of vision, treating complications, and helping patients to cope with the psychosocial impact of their disease.^[2]

Retinitis Pigmentosa affects 1 in 4000 people.³ However the prevalence of Retinitis Pigmentosa is about 1:750 in the adult population of rural Central India. This figure is slightly lower or similar to the figure reported by Sen et al (2008),^[4] from the South Indian population with a prevalence of 13/7461 or 0.17%. If that study was stratified into the urban part (prevalence: 1/930 or 0.11%) and the rural part (prevalence: 1/372 or 0.27%), the prevalence for retinitis pigmentosa in the rural region was considerably higher than in the urban Central Indian population.^[14] These figures from India are higher than the data from early surveys from other countries such as the study conducted by Bunker et al. (1984),^[5] in Maine/USA in 1984 (prevalence rate: 1:4756) or performed by Bunday and Crews (1984) in Birmingham, England (prevalence rate: 1:4869).^[6] A nation-wide registration of Danish patients with retinitis pigmentosa revealed a prevalence of 1:3943 (Haim 2002).^[7]

Hence this study was conducted to study the effect of oral acetazolamide 250mg BD on macular edema secondary to retinitis Pigmentosa for a duration of 3 months to assess macular edema by OCTA and evaluate the changes during treatment of 3 months.

MATERIALS AND METHODS

The prospective observational study was carried out at the Regional Institute of Ophthalmology (M.D. Eye Hospital, Dr. Katju Road, Nakhas Kohna, Prayagraj) which is a tertiary care centre and one of the largest eye hospital in Prayagraj, after taking permission from ethical committee of M.L.N Medical College, Prayagraj. The proposed study was conducted over a span of one year from September 2021 to September 2022.

Sample Size: Total of 30 patients with known history of Retinitis Pigmentosa, having macular edema were included in the study provided they fulfill inclusion and exclusion criteria.

Selection of Cases

The Inclusion criteria

- Age of patients between 20-65 years.
- Known case of Retinitis Pigmentosa, including patients having atypical form or associated with any syndrome.

The Exclusion Criteria

- Any systemic or ocular disease that might influence macular thickness such as diabetes, uveitis, ARMD, Vascular occlusion.
- Patients with dense mature cataracts, hyper mature cataracts were excluded from the study because it was difficult to assess their fundus and OCT showed poor signal.
- Allergy to sulpha drugs as oral acetazolamide therapy will not be possible in such patients.

- Patients with known history of cardiac disease or renal disease, as the adverse effects of oral acetazolamide (hypokalemia, renal stones) might worsen their condition.

Baseline Evaluation

All subjects at the time of inclusion in our study underwent baseline investigations which included complete systemic examination. Detailed medical history regarding any comorbidities was taken. Past history in the form of previous intake of any oral drugs for a long term and any intraocular surgery was taken.

Methodology of Data Collection

After explaining the procedures, all subjects signed an informed consent and underwent a complete history taking and eye examination. Detailed history were obtained from the patients including Family history, Treatment history, Medical history including history of hypertension, diabetes mellitus (duration of diabetes, type of diabetes)

General examination like pulse, blood pressure, respiratory rate.

Pretreatment evaluation

A complete ocular examination will be conducted comprising of following:

1. Base line Snellen visual acuity.
2. Best corrected visual acuity of all the patients after retinoscopy have been done.
3. Anterior segment examination was done with slit lamp biomicroscopy.
4. Intraocular pressure measurement have been done by applanation tonometer.
5. All patients underwent dilated fundus examination by Direct Ophthalmoscopy, Indirect ophthalmoscopy and slit lamp biomicroscopy with 78D/90D for evaluation of macula. Special care was taken to look for diabetic changes in fundus.
6. The foveal thickness was assessed using Optical Coherence Tomography, Spectral domain Topcon 3D Maestro 2 (Heidelberg Engineering). Patients were examined after dilating the pupil using tropicamide 1% and phenylephrine hydrochloride. Spectral domain OCT was used to acquire 1 macular scan in an area of 6 x 6 mm² using the macular cube 200 x 200 scan protocol in each study eye.

The built in software was used to produce retinal thickness maps, which then were averaged over nine retinal sub fields in a 6-mm diameter circle centered at the true foveal location, as defined by the Early Treatment Diabetic Retinopathy Study. The standard retinal subfields are central, inner superior, inner nasal, inner inferior, inner temporal, outer superior, outer nasal, outer inferior, and outer temporal. The inner and outer sub fields are bounded by the 3- and 6- mm diameter circle, respectively.

The central foveal subfield is bounded by the innermost 1-mm diameter circle. The average of the four quadrant macular thickness in the inner (1-3 mm) and outer (3-6 mm) rings was calculated as

average inner macular thickness and average outer macular thickness, respectively. Overall average macular thickness over the entire grid area also were obtained from the computational software output. In our study we were focusing more on central foveal field thickness.

Optical Coherence Tomography Angiography was done to assess the vascular status at the level superficial and deep retinal layer capillary plexus. The area of foveal avascular zone and was assessed to compare it with the macular edema.

RESULTS

Out of 30 patients, 20 patients (66.66%) were male and 10 patients (33.34%) were female. Calculated χ^2 - value (1.714) was less than critical χ^2 - value (3.841), hence difference in the proportion of sex of patients was insignificant ($p=0.190$).

Table 1: Distribution of age (in years) in the study subjects

Sex	Mean age (years)	SD	Cal tvalue	Critical tvalue	pvalue	Statistical inference
Male	34.60	08.12	1.052	2.048	0.301	Insignificant
Female	31.50	06.38				

The Mean age of patients was 33.56 ± 07.61 years. Male and female patients had mean age of 34.60 ± 08.12 years and 31.50 ± 06.38 years respectively. Calculated t-value (1.052) was less than critical t-value (2.048), hence difference in the mean age of male and patients was insignificant ($p=0.301$).

Table 2: Comparison of variation in visual acuity at baseline between study subjects

Visual acuity (Snellen)	Number of eyes	Percentage	Calculated χ^2 - value	Critical χ^2 value	pvalue	Statistical inference
3/60	01	03.33	7.224	12.591	0.300	Insignificant
4/60	03	10.00				
5/60	09	30.00				
6/24p	04	13.33				
6/36	04	13.33				
6/36p	01	03.33				
6/60	08	26.68				

Mean visual acuity of all 30 patients at base line was 0.12 ± 0.06 (decimal equivalent). The number and percentage of eyes with different visual acuity as per Snellen equivalent with insignificant difference in proportion is mentioned in Table 2.

Table 3: Comparison of visual acuity with pinhole at baseline among study subjects

Visual acuity (pinhole) (Snellen)	Number of eyes	Percentage	Calculated χ^2 - value	Critical χ^2 value	pvalue	Statistical inference
3/60	02	06.67	9.961	12.591	0.324	Insignificant
4/60	03	10.00				
5/60	09	30.00				
6/24p	01	03.33				
6/36	04	13.33				
6/36p	02	06.67				
6/60	09	30.00				

Mean visual acuity (with pinhole) of all 30 patients at base line was 0.10 ± 0.04 (decimal equivalent). The number and percentage of eyes with different visual acuity as per Snellen equivalent with insignificant difference in proportion is mentioned in Table 3.

Table 4: Mean Central Macular Thickness(micrometre) measured by OCT at baseline and at various time intervals during follow up

Intervals	CMT thickness (μm)	F- value	p- value	Statistical inference
Base line	452.50 ± 87.42	25.60	<0.0001	Significant
2 nd week	412.20 ± 72.98			
4 th week	385.10 ± 64.37			
6 th week	358.30 ± 59.38			
8 th week	330.50 ± 52.55			
10 th week	307.30 ± 49.42			
12 th week	288.00 ± 49.71			

The mean central macular thickness(micrometre) at baseline and at follow up. Considering base line, differences in the central macular thickness at various follow up periods is significant.

Table 5: Tukey's multiple comparison table to compare the mean central macular thickness at different follow up interval with the baseline

Tukey's multi comparison test	Mean difference	q	Significant (P<0.05)	95% class difference
Baseline vs 2 nd week	40.30	3.471	No	-8.919 to 89.52
Baseline vs 4 th week	67.33	5.799	Yes	18.11 to 116.6
Baseline vs 6 th week	94.13	8.107	Yes	44.91 to 143.4
Baseline vs 8 th week	121.9	10.50	Yes	72.71 to 171.2
Baseline vs 10 th week	145.1	12.50	Yes	95.91 to 194.4
Baseline vs 12 th week	164.5	14.16	Yes	115.2 to 213.7
2 nd vs 4 th week	27.03	2.328	No	-22.19 to 76.25
2 nd vs 6 th week	53.83	4.636	Yes	4.614 to 103.1
2 nd vs 8 th week	81.63	7.031	Yes	32.41 to 130.9
2 nd vs 10 th week	104.8	9.029	Yes	55.61 to 154.1
2 nd vs 12 th week	124.2	10.69	Yes	74.95 to 173.4
4 th vs 6 th week	26.80	2.308	No	-22.42 to 76.02
4 th vs 8 th week	54.60	4.702	Yes	5.381 to 103.8
4 th vs 10 th week	77.80	6.700	Yes	28.58 to 127.0
4 th vs 12 th week	97.13	8.366	Yes	47.91 to 146.4
6 th vs 8 th week	27.80	2.394	No	-21.42 to 77.02
6 th vs 10 th week	51.00	4.392	Yes	1.781 to 100.2
6 th vs 12 th week	70.33	6.057	Yes	21.11 to 119.6
8 th vs 10 th week	23.20	1.998	No	-26.02 to 72.42
8 th vs 12 th week	42.53	3.663	No	-6.686 to 91.75
10 th vs 12 th week	19.33	1.665	No	-29.89 to 68.55

Table 5 shows a significance in the difference between central macular thickness at baseline and at various time intervals during follow up. The duration of acetazolamide treatment given in the study subjects was 12months and the subjects were on follow up for the same duration.

Table 6: Comparison among Mean visual acuity (Snellen) at the end of 3month follow up in the study subjects

Visual acuity (Snellen)	Number of eyes	Percentage	Calculated χ^2 - value	Critical χ^2 value	pvalue	Statistical inference
5/60	03	10.00	3.885	15.507	0.867	Insignificant
6/12	04	13.33				
6/12p	03	10.00				
6/18p	06	20.00				
6/24	02	06.66				
6/24p	02	06.66				
6/36	06	20.00				
6/36p	01	03.35				
6/60	03	10.00				

Table 6 thereby show that there is no statistical significance in the difference between the mean visual acuity among the study subjects when the baseline visual acuity and the visual acuity at the end of 12 weeks are compared, thereby concluding that the change in visual acuity is variable.

Table 7: Comparison of visual acuity at base line and 3rd month (decimal equivalent)

Time of measurement	Mean VA	SD	Calculated t -value	Critical t - value	p-value	Statistical inference
Baseline	0.12	0.06	9.128	2.045	<0.0001	Significant
3 rd month	0.27	0.15				

Table 7 show that there is a statistically significant difference between the visual acuity (decimal equivalent) at baseline and at the end of 12 weeks (3rd month).

DISCUSSION

The average age of patients was 33.56 ± 07.61 years. The average age of male and female patients was 34.60 ± 08.12 years and 31.50 ± 06.38 years respectively. This is in accordance with the study conducted by Motokazu Tsujikawa et al 2008 where it was found that the mean age of presentation of patients with Retinitis pigmentosa was 35.1 years and the median age was 36.5. Increasing age is said to be related to worsening of the disease and progressive

diminution of vision. Another multicentre, cross sectional study conducted by OH Onakpoya et al 2016 where it is seen that The mean age of RP patients based on the World Health Organization's category of normal vision in the better eye was 32.31 ± 15.9 years and the visual impairment was 34.35 ± 18.7 years. Nearly 79.2% patients in this study were aged between 16-64 years, which is also in accordance with our study.

According to our study, out of 30 study subjects, 20 were males and 10 were females. Although the

difference in proportion of gender of patients was insignificant ($p=0.190$) in our study, but the number of male patients is more than the number of female patients. This is in accordance with the study conducted by G. Ravi Babu et al 2017,^[10] where it seen that out of 86 patients diagnosed as a case of Retinitis Pigmentosa, 52 cases were males and 32 cases were females, suggestive of male preponderance.

In our study, the central macular thickness (CMT) was measured by Spectralis Optical Coherence Tomography TOPCON Maestro 2 available in the department. Previously many studies have found that Optical Coherence Tomography is a reliable tool for measuring central macular thickness. Jin Kyun Oh et al 2019^[11] made an observation that changes in retinal thickness and cystoid macular edema can be best assessed by OCT.^[12]

Similarly a study conducted by Liu G et al 2013^[13] suggested that Spectral Domain optical Coherence Tomography can significantly increase the understanding of the structural changes occurring in the retinal layers in patients with Retinitis Pigmentosa. Moreover the study also suggests that the structural changes seen in OCT can be correlated to the visual functions in RP.

According to our study there was no significant difference in pre treatment and post treatment superficial foveal avascular zone (FAZ), done by OCTA, which was in accordance with the study conducted by Yoshito Koyanagi et al 2018,^[13] and Ling Ling et al 2019.^[14] Both these studies noted that there were no significant difference in superficial foveal avascular zones among RP patients.

In contrast to this, in the study conducted by Deutsch et al 2021,^[15] it was noticed that the patients having macular edema secondary to Retinitis Pigmentosa, the foveal avascular zone (FAZ) in the superficial vascular complex was significantly decreased in its both vertical and horizontal extent as well as in its area.

In another study conducted by Ruben Jaregui et al 2018,^[16] suggested a correlation between BCVA and the FAZ at the level of superficial capillary plexus. The FAZ area at the DCP was significantly enlarged in RP patients. In their study, it was found that at any given visit, the SCP exhibited perfusion density and FAZ area values that significantly differed from those of the DCP ($P < 0.001$ for all comparisons).

In our study, the mean central macular thickness (CMT) before giving acetazolamide therapy was 452 ± 87.42 micrometre and after 3 months of follow up on giving the treatment, the mean CMT was 288 ± 49.71 micrometre. A statistically significant difference has been calculated between the central macular thickness before and after Acetazolamide treatment for three months ($p < 0.0001$). This observation is in accordance to the study conducted by Quinzu Huang et al 2017.^[17] According to the study, the improvement in macular edema by carbonic anhydrase inhibitors is due to restoration of polarity of RPE cells by selectively

blocking the activity of different anhydrase isozymes located in basolateral membrane of RPE cells, thus facilitating subretinal fluid resorption.

Cystoid macular edema is one of the few treatable causes of visual loss in RP. In our study, the mean decrease in macular thickness after giving oral acetazolamide for three months is 164.5 micrometre, which is statistically significant ($p < 0.05$). This is in accordance with the cohort study conducted by Gerald Liew et al 2015,^[18] wherein it was seen that 32 eyes of 17 patients were treated with oral acetazolamide for a median period of 4 months (range 2-12 months), out of which 28% of eyes (41% patients), showed an improvement in mean OCT CSF thickness of 115 micrometre. Also, Grover et al 1997^[19] reported results from a prospective, double masked, cross-over study of five patients that all (100%) showed angiographic improvement with oral acetazolamide, compared with two (40%) who improved with topical dorzolamide.

Our study is also in accordance with the study conducted by Gerald Fishman et al,^[20] where a decrease in macular edema was observed after Acetazolamide 500mg/day for a two week period.

A study conducted by Bakthavatchalam et al.^[21] Where it was concluded that Oral acetazolamide should be the first-line treatment in CME secondary to retinitis pigmentosa. For those patients intolerant to the side effects of acetazolamide, topical dorzolamide is an appropriate alternative.

The last aspect studied in our study is the effect on visual acuity (VA) after 3 months. The mean of the improvement during the 3 months in Visual acuity is 0.15, which is statistically significant ($p < 0.0001$). This is in accordance to the prospective, crossover study conducted by Sandeep Grover et al,^[22] 1997, wherein in 3 out of 5 of the study subjects who were given oral acetazolamide, showed an improvement ≥ 7 Snellen letters.

Our study is in accordance with the study conducted by Nicola Orzalesi et al,^[23] in which The therapeutic effect of long-term treatment with acetazolamide (from 3 weeks to 16 months) of seven patients with retinitis pigmentosa was studied. Improvement in visual acuity was found in almost all the eyes, accompanied by an improvement in the macular threshold in two patients.

The study conducted by Stacey Strong et al 2004^[24] suggested the improvement in visual acuity after oral carbonic anhydrase inhibitors, thereby concluding that it can be used as one of the modalities of treatment.

CONCLUSION

Retinitis Pigmentosa is a degenerative retinal disorder with a male predominance. In our study, even though there is no statistical difference between number of male and female patients, but the number of male patients is definitely more than female patients.

The severity of the disease increases with age. There is marked optic disc pallor, arterial attenuation in later stages as well with increasing age.

Macular edema occurring in Retinitis Pigmentosa is due to the reversal of polarity of the cells of outer blood retinal barrier, thereby causing influx of fluid from choriocapillaries. Macular edema is one of the treatable causes of central vision loss in Retinitis Pigmentosa.

There are various investigation modalities to detect the retinal changes occurring in Retinitis Pigmentosa. In our study Optical Coherence Tomography Angiography helps in assessing the central foveal thickness and also the effect on foveal avascular zone at the level of both superficial and deep capillary plexus.

In our study Optical Coherence Tomography was employed to assess the effect of oral carbonic anhydrase inhibitors on the macular edema before and after therapy and during follow up, thereby concluding that OCT is one of the best investigative modality for assessing the retinal thickness.

Out of the various treatment modalities, oral carbonic anhydrase inhibitors (in our study, Tablet Acetazolamide 250mg BD) has been seen to effectively decrease the macular edema in RP patients over time.

There were a few limitations in our study for example the number of study subjects selected might be inadequate and a larger number of patients is required to extrapolate the study findings onto a larger population. The adverse effects of oral carbonic anhydrase inhibitors like numbness and tingling sensation in hands and feet, gastritis etc deterred the patients from continuing the treatment, thereby causing the need to decrease the dose and also loss to follow up.

REFERENCES

- Hamel C. Retinitis pigmentosa. Orphanet journal of rare diseases. 2006 Dec;1(1):1-2.
- Frick KD, Roebuck MC, Feldstein JJ, McCarty CA, Grover LL. Health services utilization and cost of retinitis pigmentosa. Archives of ophthalmology. 2012 May 1;130(5):629-34.
- Sen P, Maitra P, Natarajan S, Sripriya S, Mathavan S, Bhende M, Manchegowda PT. CERKL mutation causing retinitis pigmentosa (RP) in Indian population—a genotype and phenotype correlation study. Ophthalmic Genetics. 2020 Nov 1;41(6):570-8.
- Sen P, Bhargava A, George R, Ramesh SV, Hemamalini A, Prema R, Kumaramanickavel G, Vijaya L. Prevalence of retinitis pigmentosa in South Indian population aged above 40 years. Ophthalmic Epidemiology. 2008 Jan 1;15(4):279-81.
- Bunker CH, Berson EL, Bromley WC, Hayes RP, Roderick TH. Prevalence of retinitis pigmentosa in Maine. American journal of ophthalmology. 1984 Mar 1;97(3):357-65.
- Bundey S, Crews SJ. A study of retinitis pigmentosa in the city of Birmingham. Journal of medical genetics. 1986 Apr;23(2):188.
- Haim M. Epidemiology of retinitis pigmentosa in Denmark. Acta ophthalmologica Scandinavica. Supplement. 2002 Jan 1(233):1-34.
- Tsujikawa M, Wada Y, Sukegawa M, Sawa M, Gomi F, Nishida K, Tano Y. Age at onset curves of retinitis pigmentosa. Archives of ophthalmology. 2008 Mar 1;126(3):337-40.
- Onakpoya OH, Adeoti CO, Oluleye TS, Ajayi IA, Majengbasan T, Olorundare OK. Clinical presentation and visual status of retinitis pigmentosa patients: a multicenter study in southwestern Nigeria. Clinical Ophthalmology. 2016 Aug 22;15:79-83.
- Sen P, Maitra P, Natarajan S, Sripriya S, Mathavan S, Bhende M, Manchegowda PT. CERKL mutation causing retinitis pigmentosa (RP) in Indian population—a genotype and phenotype correlation study. Ophthalmic Genetics. 2020 Nov 1;41(6):570-8.
- Oh JK, Nuzbrokh Y, Lima de Carvalho Jr JR, Ryu J, Tsang SH. Optical coherence tomography in the evaluation of retinitis pigmentosa. Ophthalmic genetics. 2020 Sep 2;41(5):413-9.
- Bhende M, Shetty S, Parthasarathy MK, Ramya S. Optical coherence tomography: A guide to interpretation of common macular diseases. Indian journal of ophthalmology. 2018 Jan;66(1):20.
- Koyanagi Y, Murakami Y, Funatsu J, Akiyama M, Nakatake S, Fujiwara K, Tachibana T, Nakao S, Hisatomi T, Yoshida S, Ishibashi T. Optical coherence tomography angiography of the macular microvasculature changes in retinitis pigmentosa. Acta ophthalmologica. 2018 Feb;96(1):e59-67.
- Ling L, Gao F, Zhang Q, He T, Zhao Y, Xing Y, Yu Y, Ji K. Optical coherence tomography angiography assessed retinal and choroidal microvasculature features in patients with retinitis pigmentosa: a meta-analysis. BioMed Research International. 2019 Nov 14;2019.
- Deutsch S, Lommatzsch A, Weinitz S, Farmand G, Kellner U. Optical coherence tomography angiography (OCT-A) in retinitis pigmentosa and macular dystrophy patients: a retrospective study. Graefes Archive for Clinical and Experimental Ophthalmology. 2022 Jun;260(6):1923-31.
- Jauregui R, Park KS, Duong JK, Mahajan VB, Tsang SH. Quantitative progression of retinitis pigmentosa by optical coherence tomography angiography. Scientific reports. 2018 Sep 3;8(1):1-7.
- Huang Q, Chen R, Lin X, Xiang Z. Efficacy of carbonic anhydrase inhibitors in management of cystoid macular edema in retinitis pigmentosa: a meta-analysis. PLoS One. 2017 Oct 12;12(10):e0186180.
- Gupta KK, Gurung G, Tulsyan N. Prevalence of Retinitis Pigmentosa in a Tertiary Eye Hospital of Nepal. Nepalese Journal of Ophthalmology. 2022 May 23;14(1):31-8.
- Apushkin MA, Fishman GA, Janowicz MJ. Monitoring cystoid macular edema by optical coherence tomography in patients with retinitis pigmentosa. Ophthalmology. 2004 Oct 1;111(10):1899-904.
- Liew G, Moore AT, Webster AR, Michaelides M. Efficacy and prognostic factors of response to carbonic anhydrase inhibitors in management of cystoid macular edema in retinitis pigmentosa. Investigative Ophthalmology & Visual Science. 2015 Mar 1;56(3):15316.
- Chen JC, Fitzke FW, Bird AC. Long-term effect of acetazolamide in a patient with retinitis pigmentosa. Investigative ophthalmology & visual science. 1990 Sep 1;31(9):1914-8.
- Bakthavatchalam M, Lai FH, Rong SS, Ng DS, Brelén ME. Treatment of cystoid macular edema secondary to retinitis pigmentosa: a systematic review. Survey of ophthalmology. 2018 May 1;63(3):329-39.
- Grover S, Fishman GA, Anderson RJ, Alexander KR, Derlacki DJ. Rate of visual field loss in retinitis pigmentosa. Ophthalmology. 1997 Mar 1;104(3):460-5.
- Strong SA, Hirji N, Quartilho A, Kalitzeos A, Michaelides M. Retrospective cohort study exploring whether an association exists between spatial distribution of cystoid spaces in cystoid macular oedema secondary to retinitis pigmentosa and response to treatment with carbonic anhydrase inhibitors. British Journal of Ophthalmology. 2019 Feb 1;103(2):233-7.