

Review

Understanding Retinitis Pigmentosa through Ayurgenomics

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ABSTRACT:

Retinitis pigmentosa (RP) is a genetically diverse set of inherited retinal dystrophies characterized by progressive photoreceptor degradation, which causes night blindness, peripheral vision loss, and eventual blindness. Despite improvements in molecular genetics, conclusive cures are still lacking. Ayurgenomics, an emerging subject that combines *Ayurveda's Prakriti*-based constitutional framework with current genomics, offers a fresh way to determining individual vulnerability and therapeutic solutions. This review examines Retinitis Pigmentosa through the lens of Ayurgenomics, comparing traditional *Ayurvedic* descriptions of hereditary and degenerative ocular illnesses to genetic insights and proposing integrative approaches for early detection, risk assessment, and individualized care.

Keywords: Retinitis Pigmentosa, Ayurgenomics, *Prakriti*, *Ayurveda*, Personalized Medicine, Photoreceptor Degeneration.

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INTRODUCTION

Retinitis pigmentosa affects approximately one in every 4,000 people worldwide and is one of the most prevalent causes of inherited blindness [3,4]. More than 80 genes have been identified, with inheritance patterns that can be autosomal dominant, autosomal recessive, or X-linked [2,5]. The condition often begins with rod photoreceptor dysfunction, which manifests as night blindness, and then advances to cone degeneration, which causes tunnel vision and eventually loss of central vision [1,4]. *Ayurveda*, India's traditional medical science, focuses on *Prakriti* (constitutional type), *Dosha* balance, and personalized therapy. The concept of *Sahaja Vyadhi* (hereditary disorders) and *Beeja dosha* (defective gametes) have striking similarities to the genetic basis of Retinitis Pigmentosa [10,11]. Ayurgenomics, a field that combines Ayurveda and genomics, links *Prakriti* phenotypes to genetic differences, providing insights into illness risk and individualized treatment responses [7,9]. Understanding Retinitis Pigmentosa through this integrative perspective enables early risk prediction, prevention, and holistic care.

RETINITIS PIGMENTOSA: A MODERN MEDICAL OVERVIEW

According to contemporary medicine, Retinitis Pigmentosa is caused by mutations in genes including RHO, RPGR, and PDE6B, which affect phototransduction and retinal metabolism [2,5]. The disease etiology begins with rod cell death, which is followed by secondary cone degeneration and retinal pigment epithelial failure [3,4]. Patients present with night blindness, peripheral vision loss, tunnel vision, pigmentary deposits in the retina, vascular constriction, and

waxy pallor of the optic disc [4]. The diagnosis is based on fundus examination, perimetry, electroretinography, optical coherence tomography, and genetic testing [4,5].

Although there is no proven cure, current therapeutic techniques include vitamin A supplementation, antioxidant therapy, low vision rehabilitation, experimental gene therapy, retinal implants, and supportive care [3,4].

The AYURVEDIC PERSPECTIVE ON RETNITIS PIGMENTOSA

Classical *Ayurveda* offers a unique perspective on Retinitis Pigmentosa through its principles of *Nidana* (etiology), *Samprapti* (pathogenesis), *Lakshana* (clinical characteristics), and *Chikitsa* (therapy). The etiology is explained by *Beeja Dosha*, which refers to genetic faults, and *Beejabhaga Avayava Dushti*, which denotes disturbances at the subtle level of gametes and corresponds to modern conceptions of gene mutations [10,11]. Such disorders are classified as *Sahaja Vyadhi*, which means congenital or hereditary conditions [10]. The pathophysiology of Retinitis Pigmentosa can be described as gradual *Vata-Pitta* vitiation, which leads to degeneration and oxidative stress. Disturbance of *Alochaka Pitta* impairs retinal metabolism, whereas depletion of *Rasa* and *Rakta Dhatus* causes insufficient nourishment of ocular tissues [12].

Descriptions of *Timira* and *Kacha*, which start with impaired night vision and advance through successive *Patalas* (layers of the eye), are similar to this slow degeneration [12]. The symptoms of Retinitis Pigmentosa closely resemble the clinical characteristics of *Ayurveda*, including *Nisha-Andhya* (night blindness), *Krishnatwa Darshana* (perception of darkness), and *Mandala Parikshaya* (progressive narrowing of the visual field) [12]. According to the disease's natural course, progressive decline eventually leads to *Linganasha*, or blindness. Regarding *Chikitsa*, *Ayurveda* places more emphasis on supportive and preventive measures than on treatments for inherited disorders.

Using *Chakshushya Dravyas* such as *Triphala*, *Amalaki*, *Yashtimadhu*, and *Shatavari* in *Rasayana* therapy improves retinal nutrition and has antioxidant benefits [13,14,15]. *Nasya* promotes sensory functions, whereas local ocular therapies like *netra Tarpana* and *Putapaka* rejuvenate the eye. [12,13]. *Pathya Ahara* and *Vihara*—dietary and lifestyle guidelines that include ghee, milk, green leafy vegetables, and avoidance of oxidative stress—further improve ocular health [14,15]. Ayurgenomics offers a new framework for exploring Retinitis Pigmentosa by linking *prakriti* with genetic predisposition [6,9]. Individuals with *Vata Prakriti* may have a higher risk of rapid neurodegeneration and Retinitis Pigmentosa progression. *Pitta Prakriti* may be more susceptible to oxidative and inflammatory retinal damage, whereas *Kapha Prakriti* individuals may have a slower degenerative process and a milder course of disease [7,8]. Emerging research has found associations between *Prakriti* types and single nucleotide polymorphisms, immunological responses, and metabolic profiles [7,9]. This correlation shows that Ayurgenomics could be a useful technique for identifying persons at increased risk for Retinitis Pigmentosa prior to symptom onset and guiding individualized preventive and treatment strategies.

DISCUSSION

Retinitis Pigmentosa is an example of a condition where current genetic research and traditional *Ayurvedic* knowledge meet. The modern concept of inherited gene mutations is in compliance with ideas like *Beeja dosha*, *Beejabhaga Avayava Dushti*, and *Sahaja Vyadhi* [10,12]. By offering a personalized and predictive model for understanding disease progression and vulnerability, ayurgenomics enhances this connection [6,9]. Early genetic screening, *Prakriti* evaluation, antioxidant supplements, *Rasayana* support, ocular medicines, and lifestyle changes could all be part of a combined approach that could significantly slow the progression of the disease and enhance patient's quality of life [13,15]. Although *Ayurveda* may not provide a definitive cure for Retinitis Pigmentosa, its preventive and personalized framework significantly complements modern biomedical strategies and holds promise for holistic management.

CONCLUSION

Retinitis pigmentosa remains an incurable but manageable hereditary retinal disorder. Ayurgenomics, which combines genetic advances with *Ayurveda's Prakriti*-based approach, represents a viable platform for personalized therapy. Early detection, individualized therapy, and integrated supporting techniques can all improve visual outcomes and quality of life. Future research should focus on enhancing *Prakriti*-genotype correlations and conducting clinical trials

that combine *Ayurvedic* medicines with genomic diagnostics to produce effective, evidence-based protocols for managing inherited retinal dystrophies.

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