# Commentary: Primary angle-closure disease in retinitis pigmentosa

The association of primary angle-closure disease (PACD) and retinitis pigmentosa (RP) is debatable. Various reports have shown that PACD occurs more commonly in RP patients than the general population. However, the mechanism of the association is poorly understood. The prevalence of PACD in the general population of India is highly variable, according to various surveys. The Vellore Eye Survey, India's first population-based glaucoma prevalence study, reported that 10.3% of the population between 30 and 60 years of age had occludable angles, that is, all PACD including primary angle-closure suspect (PACS), primary angle closure (PAC), and primary angle-closure glaucoma (PACG).[1] The Aravind Comprehensive Eye Survey reported that the prevalence of PACG in those over 40 years of age in rural south India was only 0.5%.[2] The wide differences in prevalence have been attributed to differences in the diagnostic criteria and varying gonioscopic techniques. However in all of the surveys, the incidence of PACS was much more than PAC and PACG. In the currently published study, PACG seems to account for a significant proportion of PACD. The study notes that 5.9% of RP patients over 10 years of age had some form of PACD. More importantly, they found that the prevalence of PACG in RP patients over 40 years (3.8%) was higher than that in the general population.[3]

Retinitis pigmentosa is generally reported to be associated with myopic refraction in contrast to Leber congenital amaurosis which is associated with hyperopia. Angle closure disease in such myopic eyes is not common. Various theories have been suggested to explain the association between RP and glaucoma. One suggestion is that both the trabecular meshwork and retina are dystrophic resulting in reduced function of both structures. The most persuasive explanation for an association with PACD has been the role of genetic factors. Both RP and PACG are known to be heritable, with family members being more commonly affected. Various genes have been implicated including the variants in RetNet genes and the Crumbs homolog 1 (CRB1).[4] Some mutations leading to RP, like those in CRB1, has been noted to be associated with hyperopia and short axial length.[5] PACD is more common in such small eyes. Presence of such mutations and phenotypic variations could explain the increased risk of developing PACD in RP. A genotypic analysis in all such patients may help identify other predisposing mutations.

On the contrary, it may be possible that the association between PACD and RP is just coincidental. The ocular biometric parameters are reportedly not different in PACG eyes with and without RP.[6] It is well known that PACD is more common in Asians than Caucasians. A study on a Chinese population showed that PACG was the predominant form of glaucoma in RP patients.[7] However, in a Canadian population, the prevalence of PACG in RP was reported to be only 1.03%.[8] Perhaps the difference in the prevalence might not be related to the presence of RP; rather, it could reflect the actual demographic distribution of PACD. Nevertheless, a study from Taiwan found that RP patients had 3.6-fold greater odds of having acute angle closure.[9] Even in the current study, the prevalence of PACG in RP patients was higher than in the general population.

There is also a higher prevalence of zonular instability in patients with RP, which may result in anterior subluxation of the lens and secondary angle closure.[10] Few reports have also linked RP with nanophthalmos, another condition with short axial length, shallow anterior chamber, and closed angles.[11] These causes of bilateral secondary angle closure may be misinterpreted as PACD skewing the results in favor of an association with PACD.

It is also possible that when the optic disc is already damaged, as in consecutive optic atrophy secondary to retinitis pigmentosa, the examiner may be at a crossroads to interpret the diagnosis as PACG rather than PACS in the presence of occludable angles. An estimation of the cup to disc ratio may not be accurate. Obviously, a visual field evaluation or retinal nerve fiber layer analysis will show defects due to the retinal dystrophy and optic atrophy. Attributing the defects to glaucoma rather than retinitis pigmentosa would be a challenge in such cases. Therefore, measuring the intraocular pressure becomes an important guide in classifying the disease.

Long-term prospective cohort studies in this regard would provide convincing evidence for or against such as association between PACD and RP. A large sample of RP patients over the age of 35 years with age-matched controls need to be evaluated periodically by independent examiners for intraocular pressure, gonioscopy and clinical examination. Additionally, stereoscopic fundus photography can aid in identifying optic disc changes early and ocular biometry can identify changes in lens position and thickness over time. Comparing the occurrence of the various forms of PACD between the two groups may help conclude the debate.

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**Website:** www.ijo.in

**DOI:** 10.4103/ijo.IJO_833_22

**Cite this article as:** Venkatesh R, Odayappan A. Commentary: Primary angle-closure disease in retinitis pigmentosa. Indian J Ophthalmol 2022;70:2452-3.