

Letter to Editor

## The 'Oxygen Paradox' of the crystalline lens: A perspective based on the ancient literature

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Dear Editor

I read with great interest the recent study published in Global Journal of Cataract Surgery and Research in Ophthalmology (GJCSRO) evaluating combined silicone oil removal and cataract extraction. The authors correctly identify that the expedited progression of cataracts in vitrectomised eyes is significantly driven by 'increased oxygen tension and oxidative stress'.<sup>[1]</sup> I would like to offer a historical-physiological perspective from the Siddha tradition (a component of the AYUSH system) that provides an ancient correlate to this modern 'Oxygen Paradox'.

The Tirumantiram, authored by the Saint Tirumular, describes the body as a synergistic machine driven by ten types of vital air (*Dasavayu*).<sup>[2,3]</sup> Verse 653 of the Tirumantiram establishes the dominance of *Thananjeyan Vayu*, characterised as the 'swelling' or 'expanding' air (*Veengal Kaatru*).<sup>[3]</sup> Historically and physiologically, *Thananjeyan* mirrors systemic oxygen (O<sub>2</sub>) – the dominant element required for metabolism, yet also the agent responsible for post-mortem expansion and oxidative decay.

While *Thananjeyan* is vital for systemic health, Tirumular identifies it as a source of ailment for the lens in Verse 656:

கண்ணில் வியாதி உரோகம்தனஞ்சயன்/  
கண்ணில் இவ்வாணிகள் காசம்அவனல்லன்/  
கண்ணினில் கூர்மன் கலந்திலன்ஆதலால்/  
கண்ணினில் சோதிகலந்ததம் இல்லையே.

(*Kaṇṇil viyāti urōkam taṇāñcayan / Kaṇṇil invānika kācam avanallaṅ / Kaṇṇiṇil kūrmaṅ kalantilaṅ ātalāl / Kaṇṇiṇil cōti kalantatum illaiyē*)

The text warns that if *Thananjeyan* (systemic air/oxygen) interferes with the eye, 'Kasam' (cataract) occurs and the 'Sothi' (the inner light or transparency of the eye) is lost because 'Koorman' (the protective air) failed to integrate. This

suggests that the lens requires *Koorman Vayu* – a specialised protective agent – to maintain its transparent state.<sup>[3]</sup>

Modern ocular physiology confirms that the crystalline lens is an avascular tissue that must maintain an extreme 'hypoxic core' (PO<sub>2</sub> <2 mmHg) to prevent the cross-linking of crystallin proteins.<sup>[4]</sup> I hypothesise that *Koorman* represents the ancient descriptor for the eye's specialised antioxidant systems (such as the glutathione pathway). These systems ensure that *Thananjeyan* (oxygen and its derivatives) is kept at bay.

The 'intrusion' of systemic air described in the Tirumantiram mirrors the modern clinical results seen after vitrectomy, where increased oxygen tension in the vitreous cavity exposes the lens to oxidative stress.<sup>[5]</sup> Recognising these historical parallels reinforces the biological necessity of ocular hypoxia. It invites further investigation into traditional preventative practices, such as *Netra Vyamam* (eye exercises) and *Pranayama* (breathing exercises), which may help reinforce the eye's natural ability to shield the lens from oxidative stress.

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### REFERENCES

1. Gosai J, Sonarkar G, Jainer S, Chaudhari A. Analytical study of silicon oil removal with cataract surgery after vitrectomy. Glob J Cataract Surg Res Ophthalmol 2025;4:76-9.

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2. Uthamarayan KS. Siddha medical physiology. Chennai: Government of Tamil Nadu Publication; 2005.
3. Tirumular. Tirumantiram. Translated by Dr. B. Natarajan. Verses 653 and 656. Kapa: Himalayan Academy Publications. Available from: <https://www.himalayanacademy.com/books/tirumantiram> [Last accessed on 2025 Dec 31].
4. Bassnett S, McNulty R. The oxygen consumption of the lens. J Physiol 2004;557:705-11.
5. Truscott RJ. Age-related nuclear cataract-oxidation is the key. Exp Eye Res 2005;80:709-25.

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