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Comparative analysis of *Timira* and Myopia: Insights from Ayurvedic and Modern Perspectives

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ABSTRACT

This study delves into the intricate understanding of eye disorders, focusing on *Timira* from Ayurvedic literature and Myopia from contemporary medical knowledge. *Timira*, characterized by blurred vision progressing to blindness, correlates with the involvement of specific anatomical layers (*Patalas*) and doshic imbalances. Myopia, a common refractive error, manifests as blurred distance vision, with its classification based on etiological factors. Ayurvedic texts detail preventive and therapeutic approaches for *Timira*, including herbal remedies and systemic treatments. In parallel, modern management of myopia involves optical corrections and refractive surgeries. Through a comparative analysis, this research elucidates the similarities and disparities between these disorders, emphasizing the importance of interdisciplinary understanding for effective diagnosis and treatment strategies.

Key words: *Timira*, Myopia, eye disorders

INTRODUCTION

The profound impact of vision-related ailments is elucidated through the concept of *Drushtigatarogas*, comprising 76 *Netravvydhi* detailed by *Acharya Sushrut*. Among these, *Acharya Sushrut* delineates 12 *Drushtigata Rogas*, while *Acharya Vagbhata* expounds upon 27 such ailments.

In Ayurvedic understanding, *Timira*'s progression and severity are closely tied to the involvement of specific *Patalas* within the eye. These *Patalas* play a crucial role in the manifestation and evolution of *Timira*.

In total, the eye comprises six *Patalas*, divided into four *Abhyantara Patalas* (internal layers) and two *Bahya Vartmagata Patalas* (external layers). These anatomical layers within the eye play vital roles in its structure and function. The *Abhyantara Patalas*, or internal layers, contribute to the intricate mechanisms of vision, while the *Bahya Vartmagata Patalas*, or external layers, serve as protective barriers and facilitate external interactions.

When the vitiated *Doshas* reach the first *Patala* of the eye, the patient will experience blurred vision, also known as *Avyakta Darshana*. This initial manifestation signifies the onset of ocular pathology, highlighting the delicate interplay between *Doshic* imbalance and visual impairment. Subsequently, as the pathology progresses to involve the second *Patala*, characterized as *Vihwala Darshana* (confusing and cloudy vision), additional symptoms emerge, reflecting the escalating severity of the condition. Concurrently, *Gochara Vibhrama* exacerbates the visual distortion, further complicating the patient's perception of space and distance.

The juxtaposition of *Avyakta Darshana* and *Vihwala Darshana* underscores the dynamic nature of ocular

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disorders, wherein subtle changes in doshic equilibrium precipitate discernible shifts in visual acuity. This sequential progression delineates the pathophysiological trajectory of *Timira*, elucidating its nuanced presentation across distinct *patalas* within the eye.

Myopia, also known as short-sightedness, is a refractive error wherein parallel light rays originating from infinity converge in front of the retina when the eye is at rest, resulting in blurred distance vision. The term "Myopia" finds its origin in the Greek word "myopia," translating to "I close the eye," underscoring the condition's characteristic difficulty in focusing on distant objects, hence its colloquial name "nearsightedness."

Simple Myopia delineates a subtype of this condition wherein the refractive status of the eye is contingent upon the optical properties of the cornea, crystalline lens, and axial length. Notably, the incidence of simple myopia peaks during the school-going years, typically between the ages of 8 and 12, leading to its designation as "school myopia."

Etiological classification of Myopia

1. Axial Myopia: This type of myopia stems from an increase in the antero-posterior length of the eyeball.
2. Curvature Myopia: Occurring due to an augmented curvature of the cornea, lens, or both.
3. Positional Myopia: This variant of myopia arises from the anterior displacement of the crystalline lens within the eye.
4. Index Myopia: Index myopia manifests as a consequence of an increase in the refractive index of the crystalline lens, often associated with nuclear sclerosis.
5. Myopia due to Excessive Accommodation: This subtype of myopia occurs in patients experiencing spasm of accommodation, wherein the ciliary muscle contracts excessively, resulting in a sustained state of near vision.

Grading of Myopia

- Low Myopia: <3.00D

- Medium Myopia: 3.00D – 6.00D
- High Myopia: >6.00D

AIM

The aim of this study is to elucidate the conceptual framework of *Patalgata Timir* as outlined in Ayurvedic classic, with a specific focus on its correlation with Myopia (nearsightedness).

OBJECTIVE

The objective is to investigate and evaluate the preventive and therapeutic methodologies recommended in Ayurvedic texts for managing *Timira* and other associated eye disorders.

MATERIAL AND METHODS

For this review, references related to *Timir* were specifically targeted by consulting a range of Ayurvedic texts, including *Charak Samhita*, *Sushruta Samhita*, and *Ashtang Hridayam*, as well as their interpretations in Sanskrit and Hindi. Also, papers from a variety of internet sources, including Google Scholar, Ayush Portal, and PubMed, were used. The gathered information was critically analyzed to provide important insights for discussion.

Literature review of Timira

Timira is an eye disorder characterized by initial symptoms of unclear vision (*Avyakta Darshana*) that can progress to complete blindness (*Linganasha*). The term "*Timira*" translates to "darkness." In Ayurvedic texts, specific causes for *Timira* are not individually outlined; instead, general causes of eye diseases are considered relevant. The clinical manifestations of *Timira* are associated with the involvement of specific layers (*Patalas*) of the eye and imbalances (vitiations) of *Doshas*. Therefore, the treatment of *Timira* depends on the stage of the disease and the predominant *Dosha* involved, with Ayurvedic scholars detailing both local and systemic management approaches.

Etymology

The etymology of "*Timira*" can be understood as stemming from the root $\sqrt{\text{Tim}}$ along with the Unadi suffix 'Kirach'. This suggests an increase in the aqueous

substance in the eye leading to a subsequent loss of light vision.

According to the Amarakosha, "Timira" signifies "darkness."

In the Halayudha Kosha, "Timira" signifies darkness that is contrasted or countered by the sun.

Etiological factors of Timira

General Causes

1. Ushnabitaptasyajalapraveshath
2. Doorekshanatha
3. Swapanaviparyaya
4. Prasakthasamrodhana
5. Kopa and Shoka
6. Klesha
7. Abhighata
8. Atimaithuna
9. Sandhana Dravyas (Suktha, Aranala, Amladravyas)
10. Kulatth Nishevana
11. Vega Vinigraha
12. Atisweda
13. Dhoomanishvanath
14. Chardhivighatath
15. Vamanathiyogath
16. Bhashpagrahath
17. Sukshma Nireekshanath

Timira as a complication

1. Several disorders have been linked to Timira in ancient literature. These include injuries to critical organs (such as trauma to the Avarta and Apanga Marma) and excessive bloodletting, as noted by Acharya Sushruta.
2. According to Acharya Charak, it can result from using nasal medication incorrectly, as well as Grahani Roga (malabsorption syndrome).

3. It has been noted by Acharya Vagbhata as a Guggulatiyoga complication.

Samprapti of Timira

Timir's pathological events begin with an increase in Doshas at each site. The Vimarga Gamana of these vitiated Doshas via Siras towards Drishti and localization in Patalas is the main source of Timira. Localization in the patalas results in Avyakta Darshana, or blurred vision, and further impairs the Patalas' capacity to operate. By obstructing the channels that carry nutrients, it further limits their availability. The continuing evolution leads to Vihwala Darshana because of the involvement of Pishitashrita and Medoashrita Patalas. The illness worsens to the point where it causes Linganasha, or total blindness.

Samprapti Ghatakas

- Dosha - Tridosha
- Pitta - Alochaka
- Kapha - Tarpaka
- Vata - Prana and Udana
- Dushya - Rasa, Rakta, Mamsa
- Adhithana - First Patala
- Agni - Jatharagni
- Srotas - Rasavaha and Majjavaha
- Srotodushti - Sanga and Vimarggamana

Purvarupa

Toda (headache or straining of the eyes) and Ashru Agamana (watering of the eyes) are noted among the numerous Purvarupa of general eye illnesses.^[1]

Rupa

Symptoms of Timira according to involvement of Patalas^[2]

Patala	Clinical Features	Su. Ut.	B.P.	As. S.	As. H.	Ma.	Y.R.	Vang
First Patala	Blurred vision	+	+	+	+	+	+	+

Second Patala	Hazyness of vision	+	+	+	+	+	+	+
	Seeing of untrue images such as gnats, hairs, webs, circles, flags, mirages and ear rings	+	-	-	+	+	+	+
	Distant objects seems to be close and near objects looks to be far away	+	+	+	+	+	+	+
	Seeing of untrue activities like rain, cloud and darkness	+	-	-	+	+	+	+
	Difficulty in threading the needle	+	-	-	+	+	+	+
Third Patala	Seeing of objects situated overhead and not below	+	+	+	+	+	+	+
	Things look as if shielded with cloths	+	+	+	+	+	+	+
	Particulars like ear / eyes are not visible when	+	+	+	+	+	+	+

	watched at any face							
	Colouring of Drishti	+	+	+	+	+	+	+
Fourth Patala	Whole impediment of Vision	+	+	+	+	+	+	+

The Prognosis of Timira

It is stated clearly by Acharya Vagbhata that if the patient or doctor ignores Timira, it would turn into 'Kacha,' and then 'Linganasha,' and the patient will become blind.^[1]

Yogaratanakara asserts that Timira is the primary cause of blindness and that it needs to be addressed right away. Timira in the first Patala is treatable since it hasn't developed discoloration, Timira in the second Patala is more difficult to cure whereas Timira of the third Patala is Yapya.^[3]

Myopia Review

Myopia, also known as nearsightedness, is a condition where the eye is unable to focus properly on distant objects. The light rays entering the eye are refracted incorrectly, causing them to converge in front of the retina rather than directly on it. As a result, distant objects appear blurred and out of focus. This can be compared to a camera out of focus, where the image appears blurry.

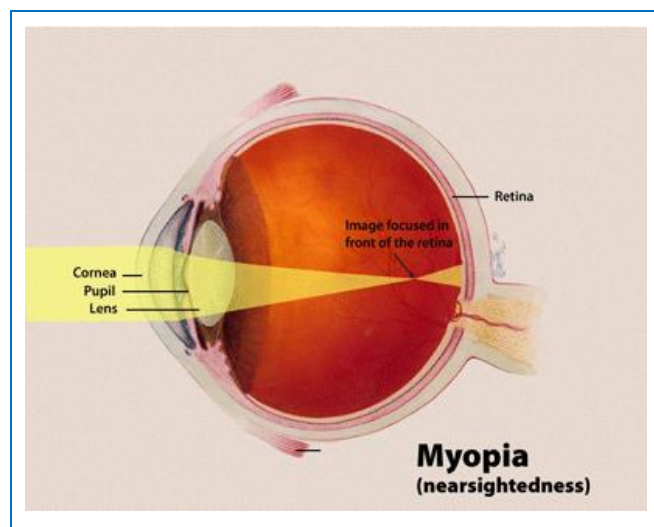


Fig. 1: Myopia

Risk Factors of Myopia

Age

A less hyperopic refraction at a young baseline age has been considered the most significant predictor of myopia. In another study, it was found that for every year of delayed stabilization, there was an increase in the total amount of myopia (overall 0.27 diopters (D) more myopia per year of delay).^[4]

Hereditary

Studies have shown that parental myopia is a risk factor for progressive myopia in children. Even having a single myopic parent can increase the rates of myopia progression in children compared to those with no myopic parent. The progression rate can be as high as 0.63 D/year for children with a myopic parent, compared to 0.42 D/year for those without.^[5]

Urbanization and Near-Work

It's interesting to note that studies have found a higher incidence of myopia in urban areas as compared to rural areas. In fact, a 2008 Polish study discovered that children living in the city were twice as likely to develop myopia than those living in rural areas. This association has been linked to factors such as increased near-work and the effects of urbanization.^[6]

Theories of myopia progression

Several theories have been proposed to explain the etiology behind myopia progression. These include:

1. Lag of accommodation
2. Mechanical tension
3. Peripheral refraction.

Lag of accommodation

The theory is based on the hypothesis that high lag of accommodation that occurs during near work in myopic eyes causes foveal hyperopic retinal blur.^[7] induces an abnormal axial growth of the eye, leading to myopia.

The mechanical tension theory and its relation to myopia

According to this theory, the eye responds to changes in axial length caused by the contraction of the ciliary muscle following accommodation. This leads to a decrease in the circumference of the sclera, causing a

more prolate shape of the eye and ultimately an elongation of the axial length of the eye, which can result in myopia.^[8,9]

Peripheral Refraction

Previous studies have shown that chronic exposure to lens-induced hyperopic defocus accelerates the axial growth of the eye. Thus, it was believed that foveal defocus influences the eye growth.^[10,11]

Clinical classification of Myopia

- a) Congenital myopia:** It is associated with an increase in axial length and overall globe size and is more common in children born prematurely or with birth defects.
- b) Simple myopia:** also known as "school myopia," typically begins in adolescence and is the most common form of myopia.^[12]
- c) Degenerative Myopia:** also known as "progressive myopia," gets worse over time and typically starts in childhood.^[13]
- d) Acquired myopia:** can be caused by spasm of the accommodation system or other conditions such as drug-induced myopia.^[14]
- e) Nocturnal myopia:** It occurs in low-light conditions, and near-work-induced transient myopia can cause temporary myopia after prolonged periods of near work.^[15]
- f) Index myopia:** It is caused by variations in the index of refraction of the ocular media and may be associated with cataracts.^[16]

Management of Timira

Preventive measures

To prevent the onset of even the most severe form of *Timira*, regular consumption of certain *Ayurvedic* herbs and foods can be beneficial. These include *Purana Ghrita*, *Triphala*, *Shatavari*, *Patola*, *Mudga*, *Amalaki*, and *Yava* (barley). Incorporating these into one's daily routine can help maintain ocular health and lessen the risk of visual impairment.^[17]

The cooked vegetables of *Jivanti*, *Sunishannaka*, *Tanduliya*, good quantity of *Vastuka*, chilli and

Madhuka and also the flesh of birds and of wild animals are beneficial for eyesight.

Samanya Chikitsa

General treatment of myopia includes *Snehana*, *Virechan*, *Raktamokshana*, *Nasya*, *Seka*, *Aschyotana*, *Tarpana*, *Murdha Basti*. According to *Dosha Avastha* these therapies administered many times.^[18]

Curative measures

Local measures

Local measures include *Tarpana*, *Putapaka*, *Seka*, *Aschyotana*, and *Anjana*.

These all together are known as “*Kriyakalpa*.”

Systemic measures

Shodhana Chikitsa: *Virechana* is said to be ideal for *Anulomana* of *Doshas* specially vitiated *Pitta*, as eye is the sight of *Pitta* predominance.

There are different treatments for *Vataja Timira*. It seems that castor oil mixed with milk is applicable for this condition, while *Triphala Ghrita* is helpful for evacuating toxins, especially in diseases of *Rakta* and *Pitta*. For *Kaphaja* type, *Virechan* with Ghee processed with *Trivrita* is recommended, and for *Tridoshaja*, oil processed with the *Trivrita* is useful.^[19]

Shamana Chikitsa: a) *Sarvadaihika Chikitsa* (systemic measures) b) *Sthanika Chikitsa* (local measures).

a) *Sthantika Chikitsa:* For the treatment of *Timira*, *Tarpana* combined with *Patoladi*, *Jeevantiyadi*, *Drakshadi*, *Shatahwadi*, and *Triphala Ghrita* is beneficial.

b) *Samaradhihika Chikitsa:* *Ghrita Kalpanas:* Different medicated forms of *Ghrita*, such as *Phalatrikadi*, *Patoladi*, *Triphla*, *Mahatriphaladya*, *Dwitiya Triphaladya*, *Laghu Triphala*, *Rasnadi*, *Dashamoola Ghritam*, *Drakshadi*, *Jeevantiyadi*, and *Shatahwadi*, are advantageous in the management of *Timira*.^[20,21]

Management of Myopia

The management for myopia includes clear, comfortable and efficient binocular vision. Optical correction can restore clear distance vision for patients with low to moderate myopia.

Aim of Myopia Control: Slow the progression of myopia and less vitreous chamber elongation.

Optical Correction: Optical correction through spectacles or contact lenses can provide clear distance vision. Recently, researchers in New Zealand have developed "dual focus" soft contact lenses for myopia control in children, which have less power in the periphery of the lens. This may reduce the tendency for the eye to lengthen and lead to progressive myopia.^[21]

Refractive Surgeries: There are several type of surgeries

- Radial Keratotomy (RK)
- Excimer laser Photorefractive Keratectomy (PRK)
- Automated Lamellar Keratomileusis (ALK)
- Laser in situ keratomileusis (LASIK)
- Phakic Intraocular Lens

DISCUSSION

Ayurvedic literature provides in-depth knowledge about eye disorders such as *Timira*. The pathology of *Timira* is closely linked to the involvement of specific layers (*Patalas*) within the eye and vitiated *Doshas*. When the first *Patala* of the eye is involved, the patient will experience blurred vision, also known as *Avyakta Darshana*. Subsequently, as the pathology progresses to involve the second *Patala*, characterized as *Vihwala Darshana* (confusing and cloudy vision). There are two stages of *Timir* - *Kacha* and *Lingnasha*, with *Lingnasha* being the more severe stage that can lead to blindness. On the other hand, myopia is a refractive error that results in blurred distance vision and can be classified based on its etiology. *Timira*, in its initial stages, is often correlated with myopia. Understanding the similarities and differences between these two disorders is essential for their correct diagnosis and treatment. *Ayurvedic* texts highlight various *Chakshushya* (eye-beneficial) foods, drugs, and therapeutic procedures aimed at enhancing visual acuity and eye health. One such procedure is *Tarpana*, which primarily balances *Vata Dosha*, followed by *Pitta* and *Kapha Doshas*. The lipophilic nature of *Ghrita* (clarified butter) in *Tarpana* helps in transporting the drug to the eye's cells,

enhancing drug absorption through the corneal surface. This process may alter the cornea's refractive index, improving vision by reducing light convergence. The *Putapaka* procedure, performed after *Tarpana*, further facilitates the absorption and assimilation of *Ghritha*, strengthening and improving vision in *Timira*. *Virechana* therapy is beneficial for balancing *Doshas*, especially for alleviating vitiated *Pitta*. *Nasya* treatments are recommended for *Timira*, using the nose for administering medication in *Urdhvajatrugata Rogas*. *Basti* effective for *Timira*, utilizing *Nirooha* and *Anuvasana Basti*, as this therapy is crucial for addressing vitiated *Vata*.

CONCLUSION

Refractive errors and clinical features of *Timira* are linked. Myopia involves both fibrous and vascular tunic while *Timira* targets the first and second *patala*. Axial myopia results due to the involvement of the first *Patala* while accommodation myopia and pathological myopia are caused by the involvement of the second *Patala*. Treatment for *Timira* depends on the type and severity of *dosha* involved. Ayurvedic herbs and foods can help prevent the onset of *Timira*. Different therapies are given based on the predominance of *doshas*. Local and systemic measures are used for curative purposes. Various medicated forms of *Ghritha*, including *Phalatrikadi*, *Patoladi*, *Triphala*, *Mahatriphaladya*, *Dwitiya Triphaladya*, *Laghu Triphala*, *Rasnadi*, *Dashamoola Ghritam*, *Drakshadi*, *Jeevantyadi*, and *Shatahwadi*, are helpful in managing *Timira*.

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