



## Review Article

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### CONCEPTUAL ANALYSIS OF AKSHI-TARPANA AND ITS ROLE IN MYOPIA: A REVIEW

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#### ABSTRACT

Myopia is a refractive error and a major eye health problem with significant social, personal, educational, and economic impacts. Globally, myopia affects 7.9 to 19.7% of the population. It is irreversible in progression and can be corrected with glasses, contact lenses, or refractive surgery. All these treatments are not patient-friendly and are also not the actual solution to the pathology occurring in the eye. The symptoms of myopia closely resemble the disease Timira involving the prathama and dwitiya patala of netra (the eye's anatomical structures). Furthermore, both diseases share similar anatomical structures and pathogenesis. There is a great need to find an ocular procedure to prevent and treat myopia having no or least adverse effects. In Ayurveda, kriyakalpa includes different topical therapeutic procedures for treating eye diseases. Tarpana is one among seven kriyakalpa that not only nourishes the eyeball but cures the diseases of the eye. Preventative and curative effects can be achieved with Tarpana karma for eye diseases. Using a special arrangement, an oily substance (ghrita) is kept in the eye for a predetermined period in Tarpana karma. This article reviews Tarpana karma and its role in myopia prevention and progression.

**Keywords:** Kriyakalpa, Myopia, Tarpana, Timira, Ayurveda, Refractive error

#### INTRODUCTION

Myopia or short-sightedness is a refractive error in which parallel rays of light from infinity are focused in front of the retina when accommodation is at rest. In addition to being the most common eye disease and the leading cause of visual impairment worldwide, it has significant social, economic, and educational implications. WHO, NPCB survey (1986-89) reported 7.35 percent of blindness caused by refractive errors<sup>1</sup>. There are several etiological factors to myopia, including disturbances of the endocrine system, nutritional deficiencies, general debility, degraded cornea and sclera, stress, excessive near-work, genetic factors, heredity, etc.<sup>2</sup>. Irrespective of its economic impact, vision impairment related to myopia has a significant effect on the physical, emotional, and social well-being of patients<sup>3</sup>. Myopic refractive errors are estimated to have decreased global productivity by 268.8 billion dollars in 2004 and cost 28 billion dollars to correct with eyeglasses, contact lenses, and surgery<sup>4</sup>. The surgical treatment of myopia is popular, but it is not appropriate or effective for everyone, and complications such as dry eyes, night glare, and reduced contrast sensitivity occur relatively frequently<sup>5</sup>. Although effective drug treatments for myopia are urgently needed and economically compelling, no FDA-approved medications are available.

In Ayurveda, painless visual disturbances are categorized under Drishtigata rogas<sup>6</sup>, which encompasses various eye conditions. These conditions can affect all four patalas (layers) of the eye, depending on the progression of visual disturbances. Myopia aligns with the symptoms of prathama and dwitiya patalgata Timira, two specific classifications of visual disturbances according to severity.

Developing a non-invasive and cost-effective treatment for myopia is of utmost importance. In Ayurveda, local ocular

therapeutic procedures, known as kriyakalpa, offer unique techniques for administering medications directly into the eye to address various eye conditions<sup>7</sup>. Among these procedures, Akshi-Tarpana is particularly significant for treating Timira, as it has Vata-Pittashamaka properties, nourishes the eyes, and improves vision. In cases of myopia, Tarpana karma has shown promising results, especially when applied promptly.

This article reviews the Akshi-Tarpana karma, its indications, contraindications, possible mode of action, and its role in managing myopia. By exploring and understanding this Ayurvedic treatment, we may uncover valuable insights to advance myopia management safely and effectively.

#### AKSHI-TARPANA

Akshi-Tarpana is a specialized ocular procedure that nourishes the eyes using medicated substances like ghrita (clarified butter), ghrimanda, vasa, majja, and more. These medicated substances are retained in the eye within a specific frame for a certain period of time. Tarpana is considered one of the primary and most effective treatments for various eye ailments<sup>8</sup>, possessing brimhana (nourishing) properties that strengthen the eyes. It is a preventative and curative therapy promoting eye health and visual acuity.

**Preferred time for Tarpana karma:** Tarpana should be performed in the early morning (purvahna) or the evening (aprahna) after the previous meal has been fully digested<sup>9</sup>.

**Prerequisites for Tarpana karma:** Before performing Tarpana, it is essential to ensure the chamber is free from direct sunlight, wind, and dust. The necessary furniture includes a 3''\*6'' table, clean mattress, sheets, and sitting stool. Required medicines include ghrita, masha flour, lukewarm water, and utensils such as

plates, bowls, a glass, and an induction cooker. Additionally, a cotton swab is needed, while an alternative method involves using swimming goggles with holes or a syringe without a needle (2 ml/5 ml).

It is crucial to confirm no eye infection before administering Tarpana. It is recommended to perform Tarpana after samshodhana karma (purification), which involves purification of both the head (shira) and body (kaya) through methods like mridu Virechana with Erandabhrishta Haritaki and Nasya with Anu taila<sup>9</sup>.

### Procedure of Tarpana karma

**Poorva karma:** The process begins with appropriate shodhan karma per the prescribed procedure. Then, sthanika abhyanga (local oleation therapy) and mridu swedana (mild fomentation therapy) are carried out<sup>9</sup>.

### Pradhan karma

#### Classical method

In the classical method, Akshi-Tarpana is performed during the forenoon or afternoon on an auspicious day, after the patient's digestion is complete and their entire body has undergone purification measures. The patient lies on their back in a well-ventilated and well-lit chamber, free from direct sunlight, wind, and dust. The eyes are gently fomented using a cotton ball soaked in lukewarm water. Subsequently, the eyes are enclosed with a solid and watertight wall (pali) made from masha (*Vigna mungo*) flour paste, which should reach a height of two angula<sup>10</sup>, as per Acharya Vagbhata's recommendation. The patient is then asked to close their eyes, and the liquified Ghrita is poured slowly over the closed eyes until all the eyelashes are covered. During the process, the patient is instructed to open and close their eyes (unmesha and nimesha). After the prescribed duration, the Ghrita is drained out through a hole near the outer canthus, and lukewarm water is used for fomentation<sup>11</sup>.

#### Alternative method

The alternative method involves using swimming goggles with a hole instead of the Masha flour paste wall. The patient is asked to lie on a bed and wear swimming goggles comfortably. Liquified ghrita is then applied slowly over the closed eyes using a syringe until all the eyelashes are covered. During the process, the patient is instructed to open and close their eyes (unmesha and nimesha). After the stipulated time, the ghrita is drained out by lifting the temporal side of the goggles and placing a cotton pad to absorb the liquid. To relieve the pressure over the eyes, mild sudation is given by rubbing the palms together and placing them over the patient's eyes. The ghrita used previously, which is absorbed in the cotton pad, can be used for a foot massage at bedtime. After each use, the goggles and syringes are washed with lukewarm water to prevent contamination.

### Sneha dharana kala (retention period of ghrita) according to Adhishthana (site) of diseases

According to different ancient texts (Sushruta Samhita, Ashtanga Hridaya, Sharangdhara, and Bhavaprakasa), the Sneha dharana kala or the retention period of ghrita (clarified butter) during Tarpana varies based on the adhishthana (site) of diseases.<sup>12</sup>

- Sandhigata diseases: 300 vakmatra (unit of measurement)
- Vartmagata diseases: 100 vakmatra
- Shuklagata diseases: 500 vakmatra
- Krishnagata diseases: 700 vakmatra
- Drishtigata diseases: 800/1000 vakmatra (variable measurement in different texts)

- Sarvagata diseases: 1000 vakmatra

### Sneha dharana kala (retention period of ghrita) according to Dosh prakopa

According to dosha prakopa (aggravation of doshas), the retention period of ghrita (clarified butter) during the Tarpana procedure varies as follows.<sup>13</sup>

- Healthy eye: 500 vakmatra
- Kapha Prakopa (aggravation of Kapha dosha): 600 vakmatra
- Pitta Prakopa (aggravation of Pitta dosha): 800 vakmatra
- Vata Prakopa (aggravation of Vata dosha): 1000 vakmatra

### Number of days for Tarpana procedure according to the predominance of doshas

Additionally, the number of days for the Tarpana procedure is determined by the predominance of doshas<sup>14</sup>.

- Vata diseases: 1 day
- Pitta diseases: 3 days
- Kapha diseases: 5 days

According to Acharya Jejjat, the number of days for the Tarpana procedure is also influenced by the strength of doshas.

- Alpadosha (mild dosha): 1 day
- Madhyamosha (moderate dosha): 3 days
- Atidosha (excess dosha): 5 days

These measurements indicate the amount of ghrita retained during the Tarpana procedure, which can be adjusted based on the specific site of disease, predominant doshic imbalance and the severity in the patient's eyes. Tailoring the treatment according to the dominant dosha is essential to achieve the best therapeutic results for various eye conditions.

**Pashchata Karma (Post-Procedure Care):** After the Tarpana procedure, the aggravated Kapha dosha should be eliminated through Shirovirechana (Nasya) and Dhoompana (fumigation) using drugs with Kapha-mitigating properties. The patient is then advised to avoid direct exposure to excessive heat, cold, wind, and bright and shiny objects to maintain the balance of doshas<sup>15</sup>.

### Precautions for Tarpana Karma

Tarpana should be performed during a time and season when the temperature is moderate, neither too hot nor too cold, and the sky is clear<sup>16</sup>. Excessive pressure on the eyes should be avoided, and caution should be exercised to prevent burns from hot oils during the procedure.

### Complications and Management of Tarpana karma

To avoid complications, it is essential not to apply too much pressure on the eyes during Tarpana. Any handling of hot oils should be done with care to prevent burns. Applying shatadhouta ghrita to the affected area can be beneficial in case of burns<sup>17</sup>. If allergic reactions like rashes or itching occur, the procedure should be stopped immediately, and the patient should take a bath. It is crucial to inform the Ayurvedic eye specialist promptly in such situations.

### Indication (yogya) for Tarpana karma

Acharya Sushruta recommends Tarpana for various eye conditions such as tamyati (feeling of darkness in front of eyes), Ativishushkam (excessive dryness of the eyes), Atidaruna (hardening of the eyes), Sheernapakshma (falling of eyelashes), Aavilanetram (dirtiness of eyes), Jihmnetram (abnormal deviation of the eyeball), and Rogaklishtam (persistent and debilitating eye diseases). Additionally, Acharya Vagbhata advises Tarpana for Kricchrochmilana (difficulty in opening eyes), Sirotkata (episcleritis), Arjuna (subconjunctival haemorrhage),

Avarna Shukra (corneal opacity), Timira (myopia), Abhishyanda (conjunctivitis), Adhimantha (glaucoma), Anyatovata (referred pain in the eyes or Sphenoid sinusitis), Vataparyaya, Vatika, Paitika diseases of eyes, and injured eyes due to Abhigata<sup>18</sup>.

#### **Contraindications (ayogya) for Tarpana karma**

Tarpana should not be performed on a cloudy day (durdin) or days with extreme temperatures, such as very hot (atyushna dina) or very cold (ati sheeta dina) days. It is also contraindicated for mentally worried individuals (chinta) after physical exhaustion (aayasa) and when complications like inflammation, redness, severe pain, etc., persist in the eyes (ashantaupadrava)<sup>19</sup>.

#### **Symptoms of Adequate Tarpana karma (Samyaka Tarpana Lakshana)**

A person who undergoes proper Tarpana karma will experience the following signs:<sup>20</sup>

1. Sukhaswapna: Sound and peaceful sleep.
2. Avbodhatva: Blissful awakening in the morning.
3. Vaishadhya: Clearness and improved clarity of vision in the eyes.
4. Nivriti: A sense of comfort and relief in the eyes.
5. Vyadhividhvasna: Alleviation and cure of the eye disease.
6. Kriya Laghvana: Easy and smooth movement of the eyes.

#### **Symptoms of Excessive Tarpana karma (Ati Tarpana Lakshana)**

If an individual experiences heaviness in the eyes (netragaurava), indistinct vision (avila), oiliness of eyes (atisnigdhta), lacrimation (ashru srava), itching (kandu), stickiness (upadeha), and aggravation of dosha (dosha samutklishhta) after Tarpana karma, it indicates that excessive Tarpana has been performed<sup>21</sup>.

#### **Symptoms of Inadequate Tarpana karma (Heena Tarpana Lakshana)**

If a person experiences dryness of eyes (netra rukshata), indistinct vision (avila), lacrimation (ashru srava), difficulty in vision (asahyam roopa darshana), and aggravation of diseases (vyadhivridhi) after Tarpana karma, it indicates that insufficient Tarpana has been performed<sup>22</sup>.

#### **Treatment for Inadequate and Excessive Tarpana**

To address both inadequate and excessive Tarpana conditions, Dhoompana, Nasya, Anjana, and Seka (applying medicated oils or substances) can be used. Seka may be either ruksha (dry) or snigdha (oily), depending on the predominance of doshas. For diseases with Vata predominance, snigdha seka is recommended; for Kapha predominance, ruksha seka, and Pitta predominance, sheeta seka should be carried out<sup>23</sup>.

#### **Formulations used for Tarpana Karma**

Several ghrita formulations have been indicated and recommended for Tarpana karma, but the most commonly used ones are Triphala ghrita, Mahatriphala ghrita, Patoladi ghrita, and Jeevanti ghrita.

#### **MODE OF ACTION OF TARPANA KARMA**

Conventional ocular therapeutics encompass medications administered through various topical forms, including drops, ointments, gels, and ocuserts. These methods serve as ways to apply medicines directly to the eye. Eye drops are the most straightforward and convenient means of topical application. Two primary forms of drug instillation in the eye are aqueous solutions and aqueous suspensions. Aqueous solutions fully dissolve the drug, making it immediately available for action. However, tears quickly dilute them and drain through the nasolacrimal duct, resulting in a short tissue contact time.

On the other hand, in aqueous suspensions, the drug is present as tiny particles floating in the eye, and they do not leave the eye as rapidly as a solution does. This leads to an extended tissue contact duration. Ointments and gels offer higher drug bioavailability as they prolong tissue contact time, preventing early absorption and dilution. Ocuserts are devices placed in the upper and lower fornix of the eye and allow the controlled release of drugs at a constant rate over up to one week.

In the eye, the corneal epithelium and endothelium are lipid permeable (lipophilic), while the stromal layer is hydrophilic<sup>24</sup>. Therefore, lipophilic and hydrophilic drugs are effectively delivered to the cornea. Conversely, drug permeability across the sclera depends on the molecular size and weight of the drug.

The Tarpana procedure utilizes a combination of ghrita (clarified butter) and decoctions of medicines, which enable the drug to easily cross the corneal epithelium (lipophilic) and endothelium (hydrophilic) of the eye. This facilitates the effective absorption of the active components at the target site. When applied to the eyes, the ghrita, with the decoction of medicines, can penetrate deeper layers of dhatus (tissues) due to its ability to pass through minute channels. Since the cell membrane contains lipids, the lipophilic properties of ghrita aid in transporting the drug to the target site.

A drug with a phospholipid-based composition is readily absorbed through the corneal surface of the eyeball due to its phospholipid nature. As lipid-soluble substances can penetrate the corneal epithelium, they can pass through it regardless of their molecular size. In Netra-Tarpana, the medicine preparations are in the form of suspensions containing particles of the drug that do not leave the eye as quickly as solutions. This extended tissue contact time and improved bioavailability in Netra Tarpana result in higher therapeutic concentrations of the drug. Consequently, there is a greater chance of the drug being absorbed by the cornea, as it exerts direct pressure on the corneal surface and allows for increased absorption.

#### **DISCUSSION**

According to the ancient Indian physician Vagbhata, every individual should sincerely try to maintain their vision throughout life. Being blind, in his view, renders the world useless, regardless of wealth, as day and night become indistinguishable<sup>25</sup>.

Uncorrected refractive error accounts for over 52% of global moderate and severe vision impairment. The global economic burden of uncorrected refractive error, predominantly due to myopia, could be as much as US\$200 billion or more annually<sup>26</sup>. Despite the urgent need and economic arguments for myopia treatments, no FDA-approved drugs exist.

Akshita-Tarpana is a highly effective Ayurvedic treatment for eye care. Various sneha dravyas, such as ghrita, tail, vasa, and majja, are used in the Tarpana procedure. Among these, ghrita is considered the best for Tarpana karma due to its chakshushya (beneficial for the eyes), arogyakaraka (promoting health), rasayana (rejuvenating), yogvahi (enhancing drug potency), and sanskaranuvarti (compatibility-enhancing) properties<sup>27</sup>. In terms of its dosha karma, Akshita-Tarpana primarily acts as a Vatashamaka (alleviating Vata dosha), followed by Pittashamaka (pacifying Pitta dosha), and then Kaphashamaka (alleviating Kapha dosha). The overall effect of the Tarpana is a Vatapradhana tridoshashamaka, which helps disintegrate the pathological manifestation of Timira, a condition primarily related to Vata dosha<sup>28</sup>.

Ghrita possesses transmissive properties, enabling it to penetrate the minute channels of the body. When applied to the eyes, it reaches deeper layers of dhatus (tissues) and cleanses them thoroughly. Additionally, ghrita's lipophilic properties make delivering therapeutic substances to the target organ easier. The corneal surface, permeable to lipid-soluble substances and water, facilitates the entry of ghrita into the eyeball. Furthermore, the ghrita preparation used in Akshi-Tarpana is a suspension containing various drug particles, allowing for a longer tissue contact time and higher bioavailability than a solution. This extended contact time ensures that the therapeutic concentration is achieved and sustained.

In the case of myopia, Tarpana dravyas (medicinal substances used in the treatment) act in two ways. Firstly, they facilitate increased absorption of the drug by the corneal surface. Secondly, they exert direct pressure on the cornea. These actions may lead to changes in the refractive index of the cornea, resulting in reduced convergence of light rays and subsequently improving visual acuity.

Research conducted by Lin *et al.* has indicated that myopia is more prevalent among children with chronic inflammatory conditions<sup>29</sup>. This suggests that the anti-inflammatory effects of Tarpana drugs could potentially play a role in halting the progression of myopia.

Another hypothesis regarding myopia progression proposes that abnormal eyeball elongation results from a scleral defect. Excessive remodelling of the scleral matrix can lead to abnormal eye growth and myopia<sup>30</sup>. It is conceivable that the drugs used in Tarpana karma may enhance scleral strength and contribute to preventing the progression of myopia by addressing this aspect.

It's worth noting that further research and studies are required to fully understand the mechanisms and effects of Tarpana treatment on myopia.

## CONCLUSION

Tarpana, the main ocular procedure in kriyakalpa, has been extensively studied through various research and scientific data. The findings suggest that Tarpana is more effective than eye drops. One of the critical advantages of Tarpana is its ability to cross the barriers present in the eye, facilitating better absorption of therapeutic agents. This, in turn, leads to nourishment and strengthening of both the ocular and periocular structures, providing direct nutrition to the targeted organ. Changes in dioptric power by changing refractive index, anti-inflammatory activity, and enhancing scleral strength Tarpana karma might work in successfully managing myopia.

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