Kriyakalpa in Ocular Disorders: Evidence from Classical Texts to Modern Clinical Studies

Dr. Amruta Dadaraje Giramkar[1], Dr Atul Babasaheb Tupe[2]
[1]*BAMS, MS (Shalakya Tantra) Assistant Professor, Shalakya Tantra Dept., G.S. Gune ayurved college, Ahilyanagar*
[2]*MBBS, MS (ENT), Assistant Professor, ENT Dept. PDVVF's Medical college and research centre, vilad, Ahilyanagar*

Abstract—**Background: Netra Kriyakalpa represents a group of localized therapeutic procedures described in Ayurveda for the management of ocular disorders. Classical texts discuss these procedures in relation to Dosha predominance, disease characteristics, and the condition of ocular tissues. Contemporary research has explored selected Ayurvedic interventions in ophthalmic conditions, although the strength of evidence varies across disorders and treatment modalities.**

Objective: To review the classical Ayurvedic descriptions of Netra Kriyakalpa, their traditional indications, relevant modern ophthalmological concepts, published clinical literature, and future research priorities.

Materials and Methods: A narrative literature review was developed using the supplied textbook material, classical Ayurvedic references cited in the literature, and selected published reviews and clinical research articles. The literature was examined descriptively to understand the classification of Kriyakalpa, their traditional therapeutic rationale, and the current level of scientific evidence.

Review: Classical Ayurvedic literature describes several procedures for ocular care, including Tarpana, Putapaka, Seka, Aschyotana, Anjana, Pindi, and Bidalaka. Charaka, Sushruta, and Sharangadhara provide descriptions of these procedures within different textual frameworks. Modern publications have investigated Ayurvedic interventions in conditions such as conjunctivitis and dry eye disease. A systematic review of Ayurvedic interventions for conjunctivitis reported potentially favourable findings but highlighted substantial methodological limitations and the need for higher-quality studies. Other publications have examined individual procedures and formulations, although small samples and heterogeneous methodologies restrict the generalizability of their findings.

Conclusion: Netra Kriyakalpa represents an important component of classical Ayurvedic ophthalmology. Published research provides a foundation for further investigation, but stronger evidence is required to establish the effectiveness and safety of individual procedures. Future studies should emphasize standardized formulations, appropriate ophthalmological assessment, validated outcome measures, systematic adverse-event reporting, and rigorous clinical trial designs.

Index Terms—**Netra Kriyakalpa, Shalakya Tantra, Tarpana, Putapaka, Aschyotana, Anjana, ocular disorders, Ayurveda, evidence-based ophthalmology.**

I. INTRODUCTION

The eyes are considered essential sensory organs in Ayurveda, and their protection and treatment receive considerable attention within Shalakya Tantra. Classical Ayurvedic literature describes various approaches to the prevention and management of Netra Roga, including medicinal formulations, dietary and behavioural recommendations, and localized therapeutic procedures collectively known as Netra Kriyakalpa.[1,2] Kriyakalpa involves the application or administration of medicinal preparations through specified procedures directed towards the ocular region. The selection of a procedure is traditionally based on the nature of the disorder, the predominance of Doshas, the stage of disease, and the intended therapeutic effect. The procedures described in Ayurvedic literature include Tarpana, Putapaka, Seka, Aschyotana, Anjana, Pindi, and Bidalaka.[1,2]

Modern ophthalmology also recognizes the importance of localized drug delivery because the eye possesses anatomical and physiological barriers that influence the penetration, retention, and distribution of therapeutic agents. These include the corneal epithelium, tear film, blood–aqueous barrier, and blood–retinal barrier. However, the pharmacological behaviour of contemporary ophthalmic preparations cannot automatically be assumed to be equivalent to that of traditional Kriyakalpa procedures.

Published literature has begun to examine selected Ayurvedic interventions using contemporary research methods. The available evidence includes conceptual reviews, clinical studies, and systematic reviews. A critical examination of this literature is necessary to distinguish traditional descriptions from experimentally supported mechanisms and clinically established outcomes.[3-6]

II. MATERIALS AND METHODS

This article follows a narrative review approach. The supplied educational material from *Samanya Chikitsa and Kriyak alpa* was used to identify the classical classification of Kriyakalpa, the descriptions of Tarpana, and the associated textual references to ocular examination and treatment.

Additional literature was identified from published Ayurvedic reviews, indexed biomedical publications, and available clinical research concerning Ayurvedic interventions in ocular disorders. Particular attention was given to literature on conjunctivitis, dry eye disease, Anjana, and other localized ocular procedures.[3-6]

The available sources were examined descriptively, with emphasis on classical concepts, the purpose of individual procedures, relevant modern ophthalmological considerations, and limitations of published evidence. This was not a registered systematic review. No claim is made that the search was exhaustive or that a formal risk-of-bias assessment was performed for every included study.

III. CLASSICAL AYURVEDIC LITERATURE ON NETRA KRIYAKALPA

3.1 Concept and significance

Kriyakalpa may be understood as a therapeutic procedure involving the appropriate selection and application of a medicinal preparation according to the intended indication. In Shalakya Tantra, these procedures are described as localized approaches to the management of ocular disorders.

The supplied textbook material emphasizes that Kriyakalpa is important in the treatment of diseases affecting the eyes, ears, nose, and related structures. It also refers to the use of different procedures according to the clinical condition and the properties of the selected medicinal preparation.

The traditional rationale is based on the principle that the procedure, formulation, duration of application, and indication should be selected appropriately. This framework is relevant to the historical study of *Ayurvedic* ophthalmology and provides a basis for investigating individual procedures through modern research methods.

3.2 Classification according to classical texts

The supplied textbook material describes differences in the number of Kriyakalpa mentioned by classical authorities.[1,2]

Charaka discusses three procedures in the relevant therapeutic context: Aschyotana, Anjana, and Bidalaka. Sushruta describes five procedures: Tarpana, Putapaka, Seka, Aschyotana, and Anjana. Sharangadhara includes seven procedures, incorporating Pindi and Bidalaka alongside the five procedures described in the Sushruta classification.

The seven commonly discussed Netra Kriyakalpa are summarized below.

Table 1. Classical classification of Netra Kriyakalpa

Kriyakalpa	Traditional procedural concept
Aschyotana	Administration of prescribed medicinal drops into the eye
Seka	Continuous or controlled pouring of a prescribed liquid over the ocular region
Anjana	Application of a medicinal preparation to the inner eyelid region according to classical procedure

Tarpana	Retention of a prescribed medicinal substance around the eyes for a specified period
Putapaka	Application of a medicinal extract prepared using a classical processing method
Pindi	Application of a medicinal preparation in a localized poultice-like form around the eye
Bidalaka	Application of a medicinal paste over the eyelids, avoiding direct application to the ocular surface

3.3 Aschyotana

Aschyotana is described as a procedure involving the administration of medicinal drops into the eye. Classical descriptions discuss its use according to the nature of the ocular disorder and the properties of the selected preparation.

From a contemporary perspective, topical ophthalmic administration is an established route for delivering medicines to the ocular surface. However, the traditional procedure and a modern sterile ophthalmic drop are not automatically equivalent in formulation, dose, sterility, or pharmacological behaviour.

3.4 Seka

Seka involves the controlled pouring of a prescribed medicinal liquid over the ocular region. The supplied material places Seka among the procedures used in the management of Netra Roga.[1]

The procedure may be examined conceptually in relation to surface exposure and local application. Its modern evaluation requires standardized preparation, temperature, duration, volume, and assessment of ocular safety.

3.5 Anjana

Anjana is a classical procedure involving the application of a medicinal preparation to the inner eyelid region using an appropriate method. Reviews of Ayurvedic literature describe different formulations and traditional indications for Anjana.[7,8]

Modern literature has examined Anjana in relation to selected ocular conditions. Nevertheless, the effects of an individual formulation cannot be generalized to all Anjana preparations because their composition, processing, intended use, and safety characteristics may differ.

3.6 Tarpana

Tarpana is one of the prominent procedures described in the supplied textbook material. The procedure involves retaining a prescribed medicinal substance around the eyes for a defined period, following the classical method.[1,2]

The traditional rationale relates to localized ocular application and the intended effect of the selected preparation. Contemporary literature on ocular drug delivery provides a possible framework for investigating residence time and surface exposure, but direct pharmacokinetic equivalence between Tarpana and modern ophthalmic formulations has not been established for all preparations.

The classical material also discusses the assessment of the ocular condition before selecting Tarpana, the duration of the procedure, and the recognition of appropriate or excessive exposure. These descriptions are important for documenting the procedural framework but should not replace contemporary ophthalmological assessment and safety standards.

3.7 Putapaka

Putapaka is described as a specialized ocular procedure involving the preparation and application of medicinal extracts using a classical processing method. It is discussed in the literature in relation to ocular care and as a distinct procedure within the wider classification of Kriyakalpa.[2,9]

Its scientific evaluation requires documentation of the source materials, processing method, composition, dose, and intended indication. The traditional rationale should be distinguished from experimentally demonstrated effects.

3.8 Pindi and Bidalaka

Pindi and Bidalaka are localized procedures described in Ayurvedic literature. Pindi involves the application of a medicinal preparation in a poultice-like form around the eye, while Bidalaka involves application of a medicinal paste over the eyelids.[2,8]

These procedures are traditionally selected according to the nature of the ocular condition. Their modern evaluation should distinguish effects on the periocular tissues from effects on the cornea, conjunctiva, or other ocular structures.

IV. MODERN OPHTHALMOLOGICAL PERSPECTIVE

4.1 Ocular drug delivery

Modern ophthalmology recognizes that delivering therapeutic substances to ocular tissues is challenging because of the protective functions of the tear film, corneal epithelium, conjunctival circulation, and other anatomical barriers.[3]

The amount of a topical medicine that reaches a target tissue depends on several factors, including formulation, concentration, contact time, drainage, tissue permeability, and the characteristics of the active substance. A localized procedure may alter exposure conditions, but this possibility must be tested experimentally for each relevant formulation.

It is therefore reasonable to investigate whether selected Kriyakalpa procedures influence local retention or exposure. It would not be scientifically justified to claim that all Kriyakalpa improve ocular bioavailability or reach posterior ocular tissues without procedure-specific pharmacokinetic evidence.

4.2 Ocular surface disorders

Ocular surface disorders, including conjunctivitis and dry eye disease, are relevant areas of investigation because symptoms and clinical signs can be assessed using established ophthalmological methods.

Conjunctivitis involves inflammation of the conjunctiva and may have infectious, allergic, or other causes. Dry eye disease involves disturbances of tear-film homeostasis and the ocular surface. These conditions differ in their pathophysiology and should not be treated as a single category when reviewing the evidence for Kriyakalpa.

The use of a particular intervention must be evaluated in relation to the specific disorder, its cause, the preparation used, and the appropriate clinical comparator.

4.3 Safety considerations

Ocular tissues are sensitive, and the use of inadequately prepared substances may introduce risks related to contamination, irritation, toxicity, or injury. Safety evaluation should therefore be an integral part of research on Kriyakalpa.

Preparations intended for ocular administration require appropriate quality control and assessment of their suitability for the intended route. Traditional use alone does not establish that every formulation is sterile, non-irritating, or safe for all ocular conditions.

V. REVIEW OF MODERN CLINICAL LITERATURE

5.1 Ayurvedic interventions in conjunctivitis

There are some published a systematic reviews and meta-analysis evaluating Ayurvedic interventions in conjunctivitis.[3] The review identified 20 eligible studies comprising randomized controlled trials, controlled clinical trials, and multiple-arm clinical studies.

The authors reported favourable pooled findings for selected symptoms and clinical signs when Ayurvedic interventions were compared with non-Ayurvedic interventions. However, they also identified important limitations, including high risk of bias and low overall study quality. The authors concluded that the findings could not be generalized confidently and emphasized the need for higher-quality research.

This publication is relevant to the broader evidence base for Ayurvedic ophthalmic interventions. However, the findings should not be interpreted as proof that every Kriyakalpa is effective for conjunctivitis. The review included different interventions, and its conclusions must be interpreted in relation to the treatments and comparisons actually studied.

5.2 Keshanjana and Netra Parisheka in dry eye disease

A published randomized comparative study examined Keshanjana and Netra Parisheka in Shushkakshipaka, correlated by the investigators with dry eye syndrome, using carboxymethylcellulose artificial tears as a comparator.[4]

This publication illustrates an effort to evaluate Ayurvedic ophthalmic interventions using a comparative clinical research design. The conceptual relationship between Shushkakshipaka and dry eye disease is relevant to comparative Ayurvedic and modern ophthalmological literature.

Nevertheless, the conclusions of an individual study must remain restricted to its tested interventions, population, diagnostic criteria, outcome measures, and study limitations. The findings cannot

automatically be extended to other Kriyakalpa or to unrelated ocular diseases.

5.3 Review literature on Anjana

Dwivedi and colleagues reviewed Anjana according to Ayurvedic classical literature, discussing its traditional description, preparation, and proposed relevance to ocular disorders.[7]

Such reviews are useful for documenting classical terminology and identifying possible areas for further scientific investigation. However, a literature review of traditional concepts does not independently establish clinical effectiveness. Claims concerning efficacy, mechanisms, or safety require supporting experimental or clinical evidence.

5.4 Integrative reviews of Kriyakalpa

Recent integrative literature has discussed Kriyakalpa in relation to classical Ayurvedic principles and contemporary concepts of ocular drug delivery.[5] These publications provide a framework for generating hypotheses about local application, formulation characteristics, and the potential relevance of individual procedures.

However, proposed similarities between traditional procedures and modern pharmacokinetic mechanisms should be treated as research hypotheses unless directly supported by appropriate experimental data. Evidence concerning one formulation or route of administration cannot be generalized to all Kriyakalpa.

5.5 Anjana in refractive errors

A case series published by Devarajan and Rajagopala examined Pathyadi Varti Anjana in individuals with refractive errors.[6] The authors reported changes in selected visual and corneal measurements following the intervention.

The publication is relevant as an example of an attempt to assess an Ayurvedic procedure using contemporary ophthalmic measurements. Nevertheless, a case series without an appropriate control group cannot establish that the intervention caused the reported changes. The findings require independent confirmation through adequately designed studies.

5.6 Overall interpretation of the evidence

The available literature demonstrates that Kriyakalpa and related Ayurvedic interventions have been investigated through conceptual reviews and clinical research. However, the evidence is heterogeneous and varies in quality.

Several limitations affect interpretation:

- Different formulations and procedures are evaluated across studies.
- Diagnostic criteria and outcome measures may not be uniform.
- Some publications use small samples or uncontrolled designs.
- Follow-up periods and adverse-event reporting may be limited.
- Findings for one ocular disorder cannot automatically be generalized to another.
- Proposed mechanisms based on traditional concepts or modern pharmacology require direct validation.

Consequently, the current literature supports continued investigation rather than definitive claims about the effectiveness of all Kriyakalpa procedures.

VI. RESEARCH GAPS AND FUTURE DIRECTIONS

6.1 Standardization of procedures

Future studies should describe each Kriyakalpa in sufficient detail to permit replication. This includes the preparation used, composition, concentration, processing method, application technique, duration, frequency, and relevant quality-control measures.

6.2 Classical textual validation

The classification and indications of *Kriyakalpa* should be examined using authoritative editions of *Sushruta Samhita, Charaka Samhita, Ashtanga Hridaya, Sharangadhara Samhita*, and relevant commentaries. This would help clarify differences in terminology, classification, and procedural description.

6.3 Disease-specific research

Future investigations should evaluate each procedure in relation to a clearly defined ocular condition. Conjunctivitis, dry eye disease, refractive errors, and

other ophthalmic disorders differ in their underlying mechanisms and clinical endpoints.
Research should therefore avoid treating all ocular disorders as a single indication for *Kriyakalpa*.

6.4 Controlled clinical trials
Randomized controlled trials with appropriate comparators are needed to determine the effectiveness of specific interventions. Study protocols should define the primary outcome, sample-size justification, follow-up duration, and methods of allocation and outcome assessment before recruitment begins.

6.5 Validated outcome measures
Studies should use appropriate ophthalmological outcome measures, which may include visual acuity, ocular surface staining, tear-film parameters, symptom questionnaires, and other condition-specific assessments.
The selection of outcome measures must correspond to the disease being investigated. Changes in subjective symptoms should be distinguished from changes in objective clinical findings.

6.6 Pharmacological and formulation research
Laboratory research may investigate formulation stability, ocular surface compatibility, active constituents, tissue exposure, and other relevant pharmacological properties. Claims concerning enhanced bioavailability or delivery to specific ocular structures should be supported by direct evidence.

6.7 Safety and quality assurance
Research should document adverse events and establish appropriate standards for the composition and quality of preparations. Particular attention should be given to sterility, contamination, ocular irritation, and contraindications relevant to the intended route of administration.

6.8 Evidence synthesis
Future systematic reviews should use reproducible search strategies, predefined eligibility criteria, appropriate risk-of-bias tools, and transparent reporting. Where studies are too heterogeneous for meaningful pooling, a structured narrative synthesis may be more appropriate than meta-analysis.

VII. LIMITATIONS OF THE REVIEW

This article is a narrative review of selected classical references and published literature. It does not constitute an exhaustive systematic review, and the sources discussed have not all undergone a uniform formal assessment of methodological quality. The supplied textbook pages provide classical descriptions of Kriyakalpa but do not independently establish contemporary clinical efficacy.
Further verification of classical editions, complete research articles, and bibliographic details is necessary before journal submission.

VIII. CONCLUSION

Netra Kriyakalpa represents an important component of Ayurvedic ophthalmology, with classical descriptions encompassing Aschyotana, Seka, Anjana, Tarpana, Putapaka, Pindi, and Bidalaka. These procedures are described within a traditional framework that emphasizes appropriate selection according to the ocular condition and the intended therapeutic purpose.
Modern publications have investigated selected Ayurvedic interventions in conjunctivitis, dry eye disease, and other ophthalmic conditions. Although some publications report favourable findings, methodological limitations and heterogeneity restrict the strength and generalizability of the evidence.
Future research should focus on standardized procedures, disease-specific clinical trials, validated ophthalmological outcome measures, formulation quality, and systematic safety evaluation. A balanced integration of classical textual analysis and rigorous contemporary research may clarify the scientific relevance of individual Kriyakalpa procedures without assuming that traditional descriptions alone establish modern clinical efficacy.

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