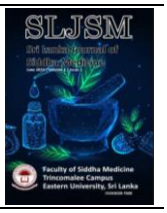
Sri Lanka Journal of Siddha Medicine



Review of Selected Siddha Herbal and Herbo-Mineral Formulations in Treating Eye Diseases

Pavithira Panneer[1]*, Poovarasi Saravanan[2], Thomas M. Walter[3]

[1*,2]Second Professional BSMS, Government Siddha Medical College, Palayamkottai, Tirunelveli. 0009-0005-8698-3603, 0009-0006-9517-408X

[3] Professor and HOD of Physiology, Government Siddha Medical College, Palayamkottai, Tirunelveli. 0000-0002-6880-1344

*Corresponding author: pavithirarspm@gmail.com

Article history:
Received: 15 April 2024
Revised: 22 November 2024
Accepted: 11 December 2024

https://doi.org/10.65714/sljsm251102

Citation:
Pavithira, P., Poovarasi, S. & Walter, T. M. (2025). Review of Selected Siddha Herbal and Herbo-Mineral Formulations in Treating Eye Diseases. *Sri Lanka Journal of Siddha Medicine*, 1(1), 18-42.

ABSTRACT

Vision is the predominant of our senses which plays an indispensable role in each and every sphere of our lives. Ophthalmology has been practiced by part of Tamil civilization since ages. The Classical Siddha text *Agasthiyar Nayana Vidhi* describes 96 types of Eye diseases. Most common Eye diseases affecting worldwide are *Kann kasam* (Cataract), *Padalam* (Keratitis), *Pillam* (Trachoma). Cataract results from opacification of lens fibers. Trachoma is the leading infectious cause of blindness, caused by Chlamydia trachomatis. Keratitis is the inflammation of the cornea, it may be infectious or non-infectious origin. Though surgery and antibiotics are treatment strategies in modern medicine, there are numerous highly effective Siddha formulations for treating these eye diseases. The objective is about reviewing 5 external Siddha formulations - *Chandra Prakasam, Suriyagandhi Kayiru, Neelakanda Mathirai, Anjanaathi Mathirai and Thambirathi Mathirai* obtained from *Agathiyar Nayana Vidhi* 500, for their effectiveness in treating *Kann Kaasam, Padalam, Pillam* and comparing them with Cataract, Keratitis and Trachoma respectively.

The phytochemicals present in the raw drugs of the 2 selected Siddha formulations, *Chandra Prakasam* (herbal) and *Suriyagandhi Kayiru* (herbo-mineral), are reviewed elaborately for their

action against *Kann Kasam, Padalam, and Pillam,* and their signs and symptoms are compared with those of Cataract, Keratitis, and Trachoma, respectively. *Chandra Prakasam* and *Suriyagandhi kayiru* synergistically act as antioxidants, anti-cataract, anti-inflammatory, anti-microbial, anti-fungal, and radioprotective. Important phytochemicals found in selected formulations are alkaloids, polyphenols, tannins, lanosterol, carotenoids, flavonoids, and antioxidant enzymes, which are integral in the management of eye diseases.

Keywords: Antioxidant, *Chandra Prakasam, Kann Kasam, Padalam, Suriyagandhi kayiru.*

INTRODUCTION

Siddha is one of the traditional systems of medicine practiced in South India and Sri Lanka. The Siddha system of medicine is as old as mankind. This system is not only a treatment approach but also encompasses mental, physical, emotional and social well-being of an individual by adopting proper lifestyle practices, dietary abstinence, potent medicinal drugs and various therapies specific to this system.

Ophthalmology *(Kann noi iyal)* is a clinical and surgical specialty with medicine that deals with the diagnosis and treatment of eye disorders. Ophthalmology has been practiced and a part of ancient Tamil civilization since ages. Siddhars, especially *Agathiyar and Nagamuni* explained a wide variety of eye diseases, treatment, prevention and its surgical methods. A few Tamil palm-leaf manuscripts belonging to the 4 th, 7th, and 12th centuries have also been found. However, well- compiled literature evidence of eye diseases from Siddha palm- leaf manuscripts have been found since the 17th century. The evolution of modern ophthalmology started only after 1851 with the invention of the ophthalmoscope by Helmholtz (Jeyavenkatesh, 2022).

Numerous formulations were mentioned in the Classical Siddha Texts, *Agathiyar Nayana Vidhi* 500, *Nagamuni Nayana Vidhi* 200. This review focuses on comparative study of eye diseases in modern and siddha system of medicine. This documentation discusses Siddha Herbal and a Herbo- mineral formulation for their effectiveness in treating eye diseases like *Kann Kasam* (Cataract), *Padalam* (Keratitis) and *Pillam* (Trachoma) (Jeyavenkatesh, 2022).

MATERIALS AND METHODS

Extensive literary searches were made regarding many eye diseases. Among the various Siddha literatures, *Agathiyar Nayana Vidhi 500* and *Nagamuni Nayana Vidhi* 200 were selected. Regarding the eye diseases, *Kann Kasam* (Cataract), *Padalam (*Keratitis*), and Pillam* (Trachoma) are highlighted in this work, which are also mentioned in figure 1.

Common Etiology of Eye disorders according to Siddha:

Changes in five fundamental elements of life - Earth, Water, Fire, Air and Space.

Changes in *Thirithoda - Vatha, Pitha, kabam.*

Improper diet.

Consumption of excessive toddy and alcohol.

Exposure of eyes to irritating stimuli like dust, smoke and so on.

Exposure to excessive heat and cold weather.

Sleeplessness

Classification of 96 eye disease mentioned in *Agathiyar Nayana Vidhi* 500

Based on affected part of eye:

1. *Paavai* (Diseases of lens and pupil) - 27
2. *Karu vizhi* (Diseases of black of the eye) - 10
3. *Vellai vizhi* (Diseases of white of the eye) - 13
4. *Karuppu vizhikum Vellai vizhikum idaiyil* (Diseases of binding unions) - 9
5. *Kuvalai* (Diseases of upper and lower eyelids) - 24
6. *Kann muzhuvathum* (Diseases of the eyeball) - 13

Based on *Thirithoda (3 humours):*

1. Impaired *vatham* - 45
2. Impaired *pitham* - 31
3. Impaired *kabham* - 20

Of the above diseases, *Kann Kasam, Padalam, Pillam, Timiram, Poo, Vizhi ganam Kann pugaichal* are considered to be the most occurring eye diseases. According to *Agathiyar Nayana Vidhi* 500, *Kasam, Padalam, Pillam* are sub classified as follows:

***Kann Kaasam*- 17 (Cataract)**

Neelakasam, Pitthakasam, Vathakasam, Valakasam, Mantharakasam, Silettumakasam, Valiyunkasam, Udaithezhu kasam, Maalaikasam, Uurukasam, Manineelakasam, Neerezhukaasam, Thunnukasam, Thutthidukasam, Vaarezhukasam, Kuvalai kasam and Anthirakasam.

The symptoms of *Kann kasam* and Cataract are mentioned in the table 1.

***Padalam* – 5 (Keratitis)**

Nagapadalam, Vellaipadalam, Panchuneerpadalam, Ratthapadalam and *Neerpadalam*

The symptoms of *Padalam* and Keratitis are mentioned in the table 2.

***Pillam - 3* (Trachoma)**

Pillam, Soozhnthidum pillam and *Neer pillam.*

The symptoms of *Pillam* and Trachoma are mentioned in the table 3.

Siddha formulations from *Agathiyar Nayana Vidhi 500 like CHANDRA PRAKASAM, SURIYAGANDHI KAYIRU, NEELAKANDA MATHIRAI, ANJANAATHI MATHIRAI, THAMBIRATHI MATHIRAI* are used for the treatment of *Kann Kasam* (Cataract), *Pillam* (Trachoma), *Padalam* (Keratitis), *Thimiram ,Kann pugaichal, Aani poo , Kuntham, Amaram, Oon valarchi, Vizhi ganam, Kann neer vadithal* . Ingredients and uses of the selected medicines are mentioned in the table 4 and figure 2.

The important phytochemicals, chemicals, pharmacological actions, and uses in Siddha of all the ingredients of *Chandra Prakasam* and *Suriyagandhi Kayiru* are detailed below and also mentioned in the table 5 and 6.

DISCUSSION

Chandraprakasam

1) *Piper nigrum*

Piperine- Antioxidant property (Monika Chamoli, 2021).

Due to flavonoids and phenol content (Satyanshu Kumar, 2021).

IC_{50} value – (85.35 ± 3.45)

Ant inflammatory activity

Xenobiotic agent which can inhibit IL6, IL 1B, Ig E and Histamine

2) *Coscinium fenestratum*

Phenols (benzaldehyde) - Quenching of oxygen free radicals

Tannins - antioxidant (Krishnamoorthy Karthika, 2018). and anti-inflammatory activity causes protein precipitation

Flavonoids (coumarin, pyranthrene) show potent antioxidant properties

(Krishnamoorthy Karthika, 2018).

Good antioxidant activity (53.3–73.1%) against the linoleic acid emulsion. The IC50 value of MeOHCf was 182.48 µg/Ml

3) *Cyperus rotundus*

Bio active phenols, quercetin and chlorogenic acid- Antioxidant property

Cyperone anti-inflammatory Inhibit lipopolysaccharide (LPS-) stimulated inflammatory response in a murine BV-2 microglia cell line, Antibacterial activity (Arunagiri Kamala, 2018).

4) *Azadirachta indica*

Azadirachtin-tetra, triterpenoid compound, Anti trypanosomal activity (block the development of T. cruzi and induce a permanent resistance)

Pyrenated flavones isolated from flowers- Antimutagenic property

Gallic acid, epicatechin and catechin - Anti-inflammatory and immunomodulatory

Nimbidin, Nimbin - Antifungal, anti-microbial (Mohammed A. Alzohairy, 2016).

Anti-oxidant, Anti-inflammatory (Subendu Sarkar, 2021).

Flower possesses highest free radical scavenging activity

AR Inhibition - control the diabetes induced cataract (Sunday E Atawodi, 2009).

IC_{50} value -57

Polyol accumulation -25.04%

5) *Terminalia chebula*

Chebulic acid, Neo Chebulic acid, gallic acid, ellagic acid -Anti-oxidant, free radical scavenging activity, cytoprotective, Anti cataract (Suresh Kumar Gupta, 2010).

Hydroxybenzoic acid - anti-oxidant (Anwesa Bag, 2013).

6) *Embelia ribes*

Embellin- Antihyperlipidemic, anti-inflammatory, anti-oxidant, radioprotective, antimitotic (Pratik R Wankhade, 2021).

Anti-oxidant properties

Phenol derivatives 3-benzenediol, 5-(8-pentadecenyl)-1, 5-(8, 11-heptadecadienyl)-1, 3-benzenediol, 3-methoxy-5-pentane-1-phenol, 5-pentadecyl-1, 5-(8-heptadecenyl)-1, 3-benzenediol, 3, 5-dimethoxy-4-hydroxyphenyl-1-O-β-D-glucopyranoside.

Ethanol extract 5.8 mg/g (Gallic Acid Equivalent is 5-25 mg/g)

Vilangin (volatile oil and embelin) 72.35 mg Radical scavenging property

Anti-aging, Anti-cancerous and Anti-helminthic.

Suriyaqandhi Kayiru

1) *Alternathera sessilis*

Extract –Antioxidant (Due to high total phenolic content) (Thomas M. Walter, 2014).

ethyl acetate extract (67.75 μg GAE/mg) followed by

methanolic (44 μg GAE/mg),

High percentage of DPPH radical scavenging activity

acetone (57.6%) and

ethyl acetate (64.73%) extracts

Anti -cataract (Sobha kota,2017) and Antimicrobial (Sivakumar, 2018).

2) *Macrotyloma uniflorum*

Antioxidant property (Manisha Gautam, 2020).

Polyphenols -vanillic acid, caffeic acid (Shuchita Sah, 2023). and tannins

Flavonoids kaempferol, quercetin and myricetin, Isoflavones daidzein and genistein

3) *Tamarindus indica*

Tartaric acid

Leaves 2 triterpenes, lupanone, lupeol

High Antioxidant property (64.5-71.7%) which is higher than the Butylated hydroxyanisole and ascorbic acid.

Wound healing activity

L-(-)-Di-n-butyl maleate -Cytotoxic activity

Sterols and triterpenes -Analgesic, anti-inflammatory activity and treatment of eye inflammation (Richard Komakech, 2019).

Methanol and acetone - Anti-microbial

4) *Azima tetracantha*

Alkaloids, Tannins, Phenols-Antioxidant property (Thendral Hepsibha, 2010).

Ascorbic acid potent reducing agent and free radical scavenger.

5) *Muthu* (Pearl)

(86% $CaCO_3$, 2-4% water, 10% conchiolin which is an organic binding agent)

Bicarbonate ion and prostaglandins - Cytoprotective effects

Antioxidative- metal chelating, O_2 scavenging

Oxidative index-Total Anti oxidative capacity TBARS, Total thiols, GSH, Ascorbic acid

Anti-oxidative enzymes -SOD, GPx, GR

Anti-aging - prolongs C. elegans life span

6) *Pavalam* (Coral)

Terpenoids, Steroid, N_2 containing compounds sesquiterpenes, diterpenes (tetradecane ring) Analgesic, anti-inflammatory, antioxidant, anti-bacterial, Neurological activity (Mengtian Han, 2023).

Antioxidant IC50 value of 27.28 μM

Sterols anti-inflammatory activity

Ceramides, alkaloids (deoxythymidine, thymine, methyluracil and urea) antifungal, antibacterial and cytotoxic activities. It can also inhibit acetylcholestan-converting protease (Mengtian Han, 2023).

7) *Thurusu* (Copper sulfate)

Copper potent biocidal properties and is used to eliminate bacteria, viruses and parasites (Sonitha, 2022).

Wound healing and Antifungal (Ethel Shiny, 2023). activity promotes angiogenesis and skin extracellular matrix formation.

Two formulations—Herbal (*Chandra Prakasam)* and Herbal mineral (*Suriya gandhi kayiru*)—were selected from the Classical Siddha literature to document their clinical efficacy in the management of Eye diseases.

Kann kasam (Cataract) is the primary cause of blindness. Cataract is mainly developed due to oxidative stress (Devesh Tewari, 2019). For the homeostasis of the antioxidant system and ROS, enzymes like catalase, SOD, and GPX are pivotal. Ellagic Acid present in *Terminalia chebula* which is a polyphenol compound, possesses antioxidant properties that can scavenge both oxygen and hydroxyl radicals and inhibit lipid peroxidation. Oxidative stress has been implicated in cataractogenesis, thus Ellagic acid exhibits anti-cataractogenic potential.

Lutein and zeaxanthin can filter high-energy photons of blue light to prevent the formation of reactive oxygen species. *Piper nigrum* increases transport rates of the xanthophylls, lutein, zeaxanthin, and isoflavones. Leaves of *Tamarindus indica, Alternanthera sessilis*, and *Azima tetracantha* possess lutein, zeaxanthin, and carotenoid compounds.

Diabetes is one of the major risk factors for Cataractogenesis and Aldose Reductase (AR) enzymes play an important role in sugar-induced cataracts. Lens AR inhibitors are isoflavones, quercetin, quercetin 2 acetate, Genistein. These are present in the extracts of *Azadirachta indica* and *Macrotyloma uniflorum* (Manisha Gautam, 2020). Genistein increases connexin (Cx) 43 expression.

Flavonoids like Chrysin, apigenin, and baicalin are the bioactive compounds inhibiting glycation, glycation-induced lens opacity, AGEs, AR, and lens protein aggregation. Flavonoids are present in almost all the ingredients of the selected Siddha herbal and herbal mineral formulations, such as Chandra *Prakasam and Suryagandhi Kayiru.*

Oxysterols improve or reverse the lens opacity in cataractogenesis—Lanosterol, N-acetylcarnitine, and 5-cholesterin-3 b,25-diol combat the aggregation of crystallines. Crystallins, the major structural lens proteins have an imperative role in lens transparency and acquire post-translational alterations during cataract formation, which lead to protein insolubility, aggregation, and loss of lens transparency (Bryanna J Lee, 2023). Alpha spinasterol, stigmasterol, and Campesterol in *Alternanthera sessilis* and *Macrotyloma uniflorum*, beta-sitosterol in *Azadirachta indica*, sterols in *Terminalia chebula* and also in Calcium carbonate of coral are the compounds which prevent crystalline formation.

Antioxidant properties of polyphenolic compounds (Mario C Foti, 2007; Rong Tsao, 2010). can be significantly credited to three mechanistic pathways, including ROS scavenging by hydrogen atom transfer (HAT), single electron transfer (SET), and metal chelating mechanisms. Polyphenols are present in *Tamarindus indica, Alternathera sessilis, Azima tetracantha, Embelia ribes, Cyperus rotandus* and *Coscinium fenestratum.*

*Pillam (*Trachoma) is a disease complex composed of two linked chronic processes: a recurrent, subclinical infectious–inflammatory disease and a non-communicable, cicatricial owing to trichiasis, *for* the Global Eradication of Trachoma, WHO launched the 'SAFE' strategy (surgery, antibiotics, facial cleanliness, and environmental improvement). Antibiotics directly inhibit bacterial *DNA synthesis* and replication (Anti-microbial, Anti-bacterial). Hydrolyzable tannins (gallic acid, chebulic acid, ellagic acid, chebulogic acid, chebulanin) present in *Terminalia chebula* and *Azadirachta indica* have antiviral, anti-fungal, and anti-microbial action; Xenobiotic agent in *Piper nigrum* has anti-inflammatory action which works efficiently in treating Trachoma. Cyperone in *Cyperus rotundas* has anti-inflammatory action by inhibiting lipopolysaccharide-stimulated inflammatory response in the microglial cell line.

Padalam (Keratitis) may or may not be associated with infection. Nimbin present in *Azadirachta indica* has anti-fungal and anti-microbial properties. Ceramides, and alkaloids (deoxythymidine, thymine, methyluracil, and urea) present in *Pavalam* possess antifungal, antibacterial, and cytotoxic activities. These phytochemicals help in the treatment of Keratitis (Anwer S El –Brady, 2015).

This study shows that most of the components of the selected Siddha herbal and herbal mineral formulation possess antioxidant, Anti-inflammatory, anti-microbial, anti-fungal, and Anti-aging properties which are needed to cure diseases like *Kann Kasam* (Cataract), *Padalam* (Keratitis) and *Pillam*(Trachoma) (Michael Rhone, 2008). The Pharmacological actions and Main Mechanism for the Treatment of Eye Diseases are explained in figure 4 and Figure 6 respectively. The Phytochemicals possessing Antioxidant properties are mentioned in the figure 4.

CONCLUSION

In this study, we conclude that aging (free radicals' formation) and infections are the main factors which lead to the most common eye diseases like *Kann kasam* (Cataract), *Padalam* (Keratitis) and *Pillam* (Trachoma). Thus, the selected Siddha formulations possess the anti-oxidant, anti-inflammatory, antimicrobial, radio protective antifungal, antimitotic properties which can combat and resist the eye infections. Alkaloids, flavonoids, tannins, terpenes, anti-oxidative enzymes, lanosterol, carotenoids and polyphenols are the important phytochemicals present in the Siddha herbal – *Chandra prakasam* and herbo mineral formulation - *Suriyagandhi kayiru* which are essential for the required pharmacological actions in treating eye diseases. By studying the Therapeutic properties and Pharmacological actions of all the ingredients of *Chandra Prakasam and Suriyagandhi kayiru*, we conclude that it has a tremendous power to cure the eye diseases like Kann *kasam* (Cataract), Pillam (Trachoma) and *Padalam* (Keratitis). Further clinical and preclinical studies are needed to study the efficacy of *Chandra prakasam and Suryagandhi kayiru.*

ACKNOWLEDGEMENT

We would like to extend our deepest gratitude to Walters' Siddha Research Centre, Palayamkottai, Tirunelveli for their valuable help, support and guidance.

CONFLICT OF INTEREST

The authors reported that there were no competing interests.

ABBREVIATIONS

Abbreviations	Definitions
IC50	Half-maximal inhibitory concentration
IL	Interleukin
Ig	Immunoglobulin
DPPH	2,2-Diphenyl-1-picrylhydrazyl
LPS	Lipopolysaccharide
LPO	Lipid peroxidation
T.cruzi	Trypanosoma cruzi
GSH	Glutathione
SOD	Superoxide dismutase
GPx	Glutathione peroxidase
GR	Glutathione reductase
C.elegans	Caenorhabditis elegans
WHO	World Health Organisation
AR	Aldose Reductase
HAT	Hydrogen atom transfer
DNA	DeoxyRibonucleic Acid
SET	Single electron transfer
GAC	Gallic Acid Equivalent

REFERENCES

Alzohairy M. A. (2016). Therapeutics Role of Azadirachta indica (Neem) and Their Active Constituents in Diseases Prevention and Treatment. *Evidence-based complementary and alternative medicine: eCAM*, *2016*, 7382506. https://doi.org/10.1155/2016/7382506 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4791507/

Khurana A.K. (2007). Comprehensive Ophthalmology, New Age International Publishers

Atawodi, S.E. and Atawodi, J.C., 2009. Azadirachta indica (neem): a plant of multiple biological and pharmacological activities. *Phytochemistry reviews*, *8*, pp.601-620.https://scholar.google.co.in/scholar?q=ar+inhibiting+activity+of+azadirachta+indica&hl=en&as_sdt=0&as_vis=1&oi=scholart#d=gs_qabs&t=1712468410763&u=%23p%3DaFzZ2UnsOYoJ

Bag, A., Bhattacharyya, S. K., & Chattopadhyay, R. R. (2013). The development of Terminalia chebula Retz. (Combretaceae) in clinical research. *Asian Pacific journal of tropical biomedicine*, *3*(3), 244–252. https://doi.org/10.1016/S2221-1691(13)60059-3 ,https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3631759/

Common Eye Disorders and Diseases. https://www.cdc.gov/visionhealth/basics/ced/index.html.

Dutta L.C., (2013), Jaypee, Modern Ophthalmology, Jaypee Brothers Medical Publishers.

Uttamarayan K.S., (2013), Siddhar Aruvai Maruthuvam, Directorate of Indian Medicine and Homeopathy,

Mohammed Iqbal P.A., (2012), Siddha maruthuvathil kann maruthuvam, Thamarai noolagam, Chennai.

Amirthalingam pillai. T. S and Vishwanathan.V.(1976) Agathiyar - Nagamuni Nayana Vidhi, 2 nd edition, Arulmigu Palani Dhandayuthapani Swami Thirukovil, Siddha medical book publication committee, office of the Director of Medical Services of India, Chennai.

Sutha.S.(2023) Medicinal Botany, Kings Academic Publishers, Tirunelveli

Ethel shiny S*1, Bharath Christian CBS2, Gomathi P3, Screening of minimal inhibitory & fungicidal concentration of purified Thurusu (Copper sulfate),https://biosci.in/index.php/jrbms/article/download/115/217

El-Badry, A.S. and Ali, S.S., 2015. Essential oils: A promising remedy against fungal and bacterial human keratitis. *Egyptian Journal of Botany*, pp.403-431.

Foti, M.C., 2007. Antioxidant properties of phenols. *Journal of Pharmacy and Pharmacology*, *59*(12), pp.1673-1685.

Gupta, S. K., Kalaiselvan, V., Srivastava, S., Agrawal, S. S., & Saxena, R. (2010). Evaluation of anticataract potential of Triphala in selenite-induced cataract: In vitro and in vivo studies. *Journal of Ayurveda and integrative medicine*, *1*(4), 280–286. https://doi.org/10.4103/0975-9476.74425,https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3117320/

Harsh Mohan, (2019), Text book of Pathology, Jaypee Brothers Medical Publishers.

Hepsibha, B.T., Sathiya, S., Babu, C.S., Premalakshmi, V. and Sekar, T., 2010. In vitro studies on antioxidant and free radical scavenging activities of Azima tetracantha Lam leaf extracts. *Indian J Sci Technol*, *3*(5), pp.571-7.

Jeyavenkatesh, J., Sridhar, S. and Ramani, S.R., 2022. A Comparative Study and Review of Siddha Ophthalmology from the Classical Siddha Literature Agatthiar Nayana Vidhi-500. *Asian Journal of Research and Reports in Ophthalmology*, *5*(1), pp.19-35. ,https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=eye+disease+in+siddha&oq=#d=gs_qabs&t=1712768058977&u=%23p%3Dsmk4fvWfm28J

Kamala, A., Middha, S. K., & Karigar, C. S. (2018). Plants in traditional medicine with special reference to *Cyperus rotundus* L.: a review. *3 Biotech*, *8*(7), 309. https://doi.org/10.1007/s13205-018-1328-6 .https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6037646/#:~:text=Therapeutic%20appli

cations%20of%20Cyperus%20rotundus%20L&text=Studies%20indicated%20that%20the%20rhizomes,2001%3B%20Dang%20et%20al.

Karthika, K., Gargi, G., Jamuna, S., Paulsamy, S., Ajmal Ali, M., Al-Hemaid, F., Soliman Elshikh, M., & Lee, J. (2019). The potential of antioxidant activity of methanolic extract of *Coscinium fenestratum* (Goetgh.) Colebr (Menispermaceae). *Saudi journal of biological sciences*, *26*(5), 1037–1042.

Komakech, R., Kim, Y. G., Matsabisa, G. M., & Kang, Y. (2019). Anti-inflammatory and analgesic potential of *Tamarindus indica* Linn. (Fabaceae): a narrative review. *Integrative medicine research*, *8*(3), 181–186. https://doi.org/10.1016/j.imr.2019.07.002 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6704379/#:~:text=Tamarindus%20indica%3B%20which%20is%20one,and%20rheumatism%20in%20traditional%20medicine

Kumar, Satyanshu & Kar, Ashish & Patel, Jinal & Beena, Chekunnath & Sohil, Vohra & Singh, Raghuraj. (2021). Antioxidant activities, phenolics and piperine contents in four Piper species from India.

Lee, B. J., & Afshari, N. A. (2023). Advances in drug therapy and delivery for cataract treatment. *Current opinion in ophthalmology*, *34*(1), 3–8.,https://pubmed.ncbi.nlm.nih.gov/36484206/#:~:text=Recent%20findings%3A%20Antioxidants%20and%20oxysterols,lens%20opacity%20in%20cataract%20models

Manisha Gautam, Shivani Katoch, Rakesh Kumar Chahota,Comprehensive nutritional profiling and activity directed identification of lead antioxidant, antilithiatic agent from Macrotyloma uniflorum (Lam.) Verdc,Food Research International,Volume 137,2020,109600,ISSN 0963-9969,https://doi.org/10.1016/j.foodres.2020.109600. https://www.sciencedirect.com/science/article/abs/pii/S0963996920306256

Mengtian Han, Zhongyuan Wang, Yiye Li, et al.May 15, 2023. The Application of Coral in Traditional Medicine and Its Chemical Composition, Pharmacology, Toxicology, and Clinical Research. *Authorea.* DOI:10.22541/au.168416189.93330751/v1,https://www.authorea.com/users/618448/articles/643475-the-application-of-coral-in-traditional-medicine-and-its-chemical-composition-pharmacology-toxicology-and-clinical-research

Monika chamoli,KP Singh,Lakha Ram,Raaz k.Maheshwari,A Systematic Review on the traditional uses,Phytochemical composition and Pharmacological Properties of black peppehttps://doi.org/10.47062/1190.0304.04

Pearl,Pharmacompass, https://www.pharmacompass.com/chemistry-chemical-name/pearl

Pratik R Wankhade, Rani D Gupta, Renuka J Das, Nishant B Awandekar and Milind J Umekar,Review on pharmacological and phytochemistry of Embelia ribes plant,https://doi.org/10.33545/27072827.2021.v2.i1a.25 https://www.pharmacognosyjournal.com/article/25/2-1-9-833.pdf

Rhone, M. and Basu, A., 2008. Phytochemicals and age-related eye diseases. *Nutrition reviews*, *66*(8), pp.465-472.https://doi.org/10.1111/j.1753-4887.2008.00078 https://scholar.google.co.in/scholar?q=cataract+phytochemicals+research+paper&hl=en&as_sdt=0&as_vis=1&oi=scholart#d=gs_qabs&t=1712768787213&u=%23p%3Dir8tS1jeLHIJ

Sah, Shuchita & Sharma, Supriya & Alam, Afroz & Baliyan, Prachi. (2023). Therapeutic and nutritive uses of Macrotyloma uniflorum (Lam.) Verdc. (Horsegram), a somewhat neglected plant of the family Fabaceae. Natural Resources for Human Health. 4. 34-50. 10.53365/nrfhh/174744.
https://www.researchgate.net/publication/376306795_Therapeutic_and_nutritive_uses_of_Macrotyloma_uniflorum_Lam_Verdc_Horsegram_a_somewhat_neglected_plant_of_the_family_Fabaceae

Sarkar, S., Singh, R. P., & Bhattacharya, G. (2021). Exploring the role of *Azadirachta indica* (neem) and its active compounds in the regulation of biological pathways: an update on molecular approach. *3 Biotech*, *11*(4), 178. https://doi.org/10.1007/s13205-021-02745-4 https://pubmed.ncbi.nlm.nih.gov/33927969/

Sivakumar, R & Sunmathi, D. (2018). Phytochemical screening and antimicrobial activity of ethanolic leaf extract of *Alternanthera sessilis* (l.) R.br. Ex dc and alternanthera philoxeroides (mart.) Griseb. 10.13140/RG.2.2.33481.19043.

Sobha Kota, Vayunandana Rao Govada, Ratna Kumari Anantha, Mahendra Kumar Verma",An Investigation into phytochemical constituents, antioxidant, antibacterial and anti-cataract activity of Alternanthera sessilis, a predominant wild leafy vegetable of South India,
https://www.sciencedirect.com/science/article/abs/pii/S1878818116304637#:~:text=sessilis%20shows%20potent%20antioxidant%20activity,bioactive%20properties%3A%20anti%2Dmicrobial%20and

Tewari, D., Samoilă, O., Gocan, D., Mocan, A., Moldovan, C., Devkota, H. P., Atanasov, A. G., Zengin, G., Echeverría, J., Vodnar, D., Szabo, B., & Crişan, G. (2019). Medicinal Plants and Natural Products Used in Cataract Management. *Frontiers in pharmacology*, *10*, 466https://doi.org/10.3389/fphar.2019.00466

Trachoma https://www.who.int/news-room/fact-sheets/detail/trachoma

Tsao R. (2010). Chemistry and biochemistry of dietary polyphenols. *Nutrients*, *2*(12), 1231–1246.

Sambasiva Pillai T.V., (1931), Tamil Medical Dictionary of siddha medicine, Directorate of Indian Medicine and Homeopathy.

Murugesa mudaliyar K.S., (2013), Gunapadam-Mooligai (Siddha Materia Medica), Directorate of Indian Medicine and Homeopathy.

Walter, Thomas M. & Merish, S. & Tamizhamuthu, M. (2014). Review of alternanthera sessilis with reference to traditional siddha medicine. International Journal of Pharmacognosy and Phytochemical Research. IJPPR. 249-254 Impact factor 1.095. https://www.researchgate.net/publication/263085590_Review_of_alternanthera_sessilis_with_reference_to_traditional_siddha_medicine

TABLE

Table 1: Comparing the Symptoms of *Kann Kasam* And Cataract

KANN KASAM	CATARACT
Kann peelai,Kann sivapu,Neer vadithal	Ocular defect, Redness, Lacrimation
Kann yerichal	Eye irritation
Karu vizhi kalangal	Corneal irritation
Maalai neerathil kann pugaichal	Night Blindness
Imai ganam	Heaviness of eyelid
Kann iruttal	Darkness of vision
Kann koosal	Glare [intolerance of bright light]
Vizhi kuthal	Pricking pain of eyes
Paarvai pugaichal	White central opacity -impair vision

Table 2: Comparing the symptoms of *Padalam* and Keratitis

PADALAM	KERATITIS
Kann sivathal	Redness of eyes
Sathai valarchi	Ptergiyum
Paarvai maraivu	Blurred vision due to corneal haze
Neer vadiyum,peelai kattum	Purulent corneal ulcer
Paaravi pugaichal	Impaired vision
Vellai padarnthu vali undagum	White opacity
Kann ganathal	Stromaloedema
Kezhimai thadithal	Swelling of lower eyelids

Table 3: Comparing the symptoms of *Pillam* and Trachoma

PILLAM	TRACHOMA
Imai thadippu	Eyelid swelling
Thurmaamisa valarchi	Hyperplasia
Vizhi uruthal	Foreign body sensation in eyes
Kann neer vadithal	Lacrimation
Imai sathai valarchi	Pannus
Imai kaduppu	Irritation
Mel imaikul sathai valarnthu uruthal	Ocular discomfort

Table 4: Selected five siddha herbal and herbo – mineral formulation for the treatment of eye diseases

S. No	Name of the formulation	Main ingredients	Adjuvant	Uses in Siddha
1	*CHANDRAPRAKASAM*	*Piper nigrum* *Coscinium fenestratum* *Terminalia chebula* *Embelia ribes*	Water Honey Mother's milk	*Thimiram* *Padalam* *Sukkiran*
2	*SURIYAGANDHI KAYIRU*	*Alternathera sessilis* *Macrotyloma uniflorum* *Tamarindus indica* Pearl	Lemon juice	*Pillam* *Padalam* *Kan kasam* *Kan pugaichal* *Kan neerpaichal*
3	*NEELAKANDA MATHIRAI*	*Cupric sulfate* *Phyllanthus niruri* *Amaranthus campestris* *Aloe arborescens*	Lemon juice	*Anippoo* *Kundham* *Padalam* *Pillam*

4	*ANJANAATHI MATHIRAI*	*Lead Sulphide* *Terminalia chebula* *Terminalia bellirica* *Pongamia pinnata*	Mother's milk	*Pitha kasam* *Kann pugaichal* *Vizhi ganam* *Pellai kattuthal* *Kan neer vadithal* *Pterygium*
5	*THAMBIRATHI MATHIRAI*	*Copper* *Glycyrrhiza glabra* *Costus speciosus* *Piper longum*	Water	*Kan Mulaigal* *Naatpatta poo* *Imai noigal*

Table 5: Therapeutic properties of *Chandra Prakasam*

S. No	Tamil Name/ Botanical Name/ Family	Parts Used	Phyto Chemicals / Chemicals	Actions	Uses In Siddha	Reference
1	*Milagu* *Piper longum* Piperaceae	Seed	Piperine Carotenoids Alkaloids Terpenes Capsaicinoids Phenols	Analgesic Antiperiodic Antivatha Antiapoptotic Antibacterial Resolvant Antioxidant	Hysteria Gonorrhea Cholera Paralysis Headache Bacterial infection Sinus Anemia	[25] [21]

2	*Maramanjal* *Coscinium fenestratum* Menispermaceae	Bark	Berberine Saponin Sitosterols Alkaloids Phenols Flavonoids Sesquiterpenes Coumarin	Ophthalmic Antiseptic Antitumor Antihelminthic Febrifuge Antioxidant Antihepatotoxic Anticancer	Tastelessness Eye disorders Piles Fever Antidote for snake poison Wound dressing Ulcers	[19]
3.	*Korai kilangu* *Cyperus rotandus* Cyperaceae	Rhizome	Essential oils Terpenoids Flavonoids Sesquiterpenes Ascorbic acid Valencene Polyphenols	Anti proliferative Anti lipidemic Anti-convulsant Astringent Demulcent Vermifuge Diuretic Diaphoretic	Pyresis Inflammation Bowel disorders Diarrhea Stomach disorders	[18]

4.	*Kadukkai Thol* *Terminalia chebula* Combretaceae	Fruit	Chebulic acid Gallic acid 1,6 di –o-galloyl D- glucose Flavonoids Sterols Tannin Triterpenoids	Immuno modulatory Radioprotective Antiaging Antimicrobial Retinoprotective Cytoprotective Liver stimulant Cardioprotective	Eye diseases-ophthalmia Constipation Jaundice Appetite Haemorrhoids	[4] [13]
5	*Vepammottu* *Azadirachta indica* Meliaceae	Bud	Azadirachtin Nimbolide Nimbin Carotene Quercetin Polyphenols Vitamin C	Antioxidant Antitumor Antimicrobial Immunomodulant Antipyretic Antifungal Antiapoptotic	Arthritis Exfoliant Fungal infection Detoxification Increase immunity	[1] [30] [3]

6	*Vaaividangam* *Embelia ribes* Myrsinaceae	Seed	Embelin, Embellinol Embelliol Phenolic acids Quinones Essential oils(vilangin) Alkaloids (christembine) Tannin	Antihelmentic Antitumor Wound healing Antihyperglycemic Radioprotective Antimitotic Antifungal Stimulant Carminative Stomachic	Epilepsy Insomnia Rhinitis CVS Disorders Cough Diarrhea Metabolic disorders	[27]

Table 6: Therapeutic properties of *Suriyagandhi Kayiru*

S. No	**Tamil Name/Botanical Name/Chemical Name/ Family**	**Parts Used**	**Phytochemical/ Chemicals**	**Actions**	**Uses in Siddha**	**Reference**
1	*Ponangaani* *Alternathea sessilis* Amaranthaceae	Leaf	Beta carotene Alpha-spinasterol Stigmasterol Campesterol	Antioxidant Wound healing Antiulcer Antifungal Alterative Refrigerant Febrifuge Cholagogue Hypoglycemic	*Kann kaasam* *Kann pugaichal* *Karuvizhinoi* Eye coolant	[31] [32] [38]

2	*Karungollu* *Macrotyloma uniflorum* Fabaceae	Seed	Inositol N-hexa decanoic acid Ethyl alpha- d - glucopyranoside Linoleic acid Vitamin C Stigmasterol	Astringent Antiinflammatory Analgesic Antioxidant Wound healing Antioxidant antilithiatic Antihelmenthic	Eye Disorders *Nalir suram* Kidney stones Bronchitis Leucoderma Piles Heart disease	[23] [29]
3	*Puli ilai* Leaf of *Tamarindus indica* Caesalpiniaceae	Leaf	Limonene Benzyl benzoate Tartaric acid Cardiac glycosides Vitamin C,B3 Vintexin Peroxidase Lupeol Flavonoids	Antiinflammatory Antioxidant Antibacterial Antifungal stimulant	Redness of eyes Eye disease Anemia Gangrene Wound healing Parasite infections Cell cytotoxicity	[20]

FIGURES

Figure 1: Figure representing the Most Common Eye Diseases

4	*Sangilai* Leaf of *Azima tetracantha* Salvadoraceae	Leaf	methanol P- coumaric acid Ferulic acid Flavonoids Phenols Carotenoids	Antioxidant Astringent Anti-inflammatory Antivenom Antiproliferative Stimulant Antiperiodic Expectorant	Rheumatism Dropsy Dyspepsia Smallpox Asthma Anemia	[15]
5	*Muthu* Pearl	Mineral	Calcium carbonate (conchiolin)	Antioxidant Anti haemolysis Antiepileptic Promoting bone growth and generation Proliferation of endothelial cells Anti haemolysis	Nebula disorder Redness of eyes Skin pigmentation CNS Disorders Sores	[26]
6	*Pavazham* Coral	Mineral	Calcium carbonate (Aragonite, Calcite) Terpenoids Steroids N_2 containing compounds	Neuroprotective Anticancer AntiInflammatory Antioxidant analgesic	Eye opacity Dizziness Dryness of mouth Migraine Convulsions Kapha diseases Lifestyle disorders	[24]

7	*Thurusu* Copper sulfate	Mineral	Cupric sulfate	Antiseptic Astringent Nutritive Emetic Fungicide Ascorbic acid metabolism	Eyes disease Trachoma Athlete foot Fungal infection in between the toes Cellular immune defense Redness of eyes	[11]

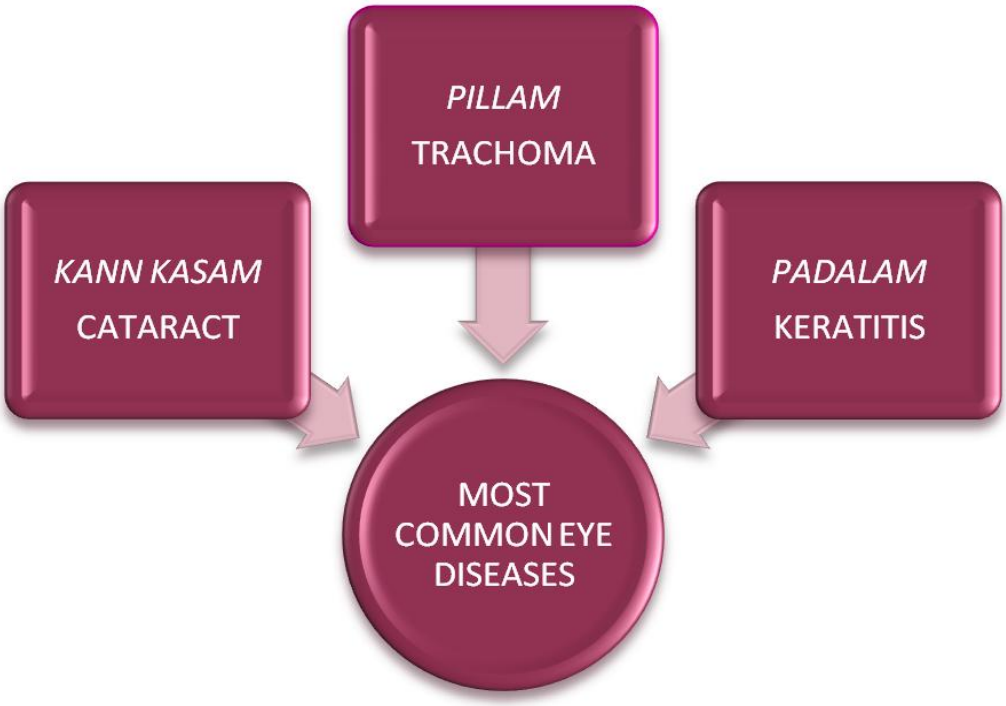


Figure 2: Figure representing the Siddha Herbal and Herbo- Mineral Formulation for Eye Diseases

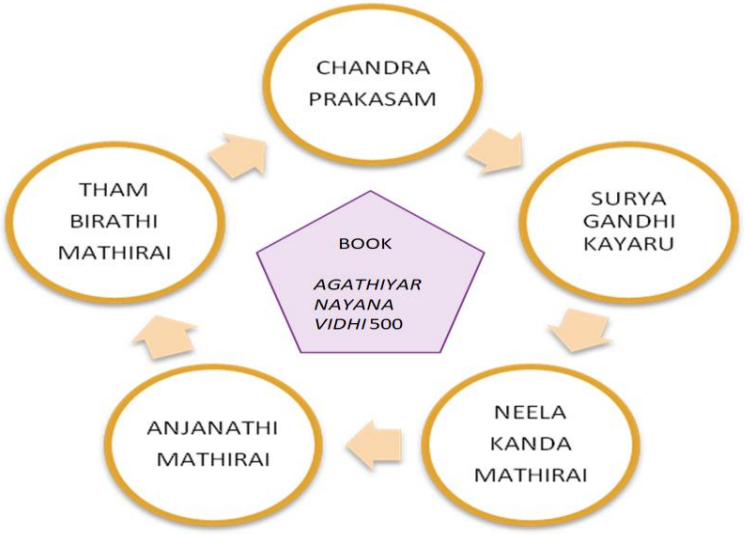


Figure 3: Important Pharmacological Actions for the treatment of Eye Diseases

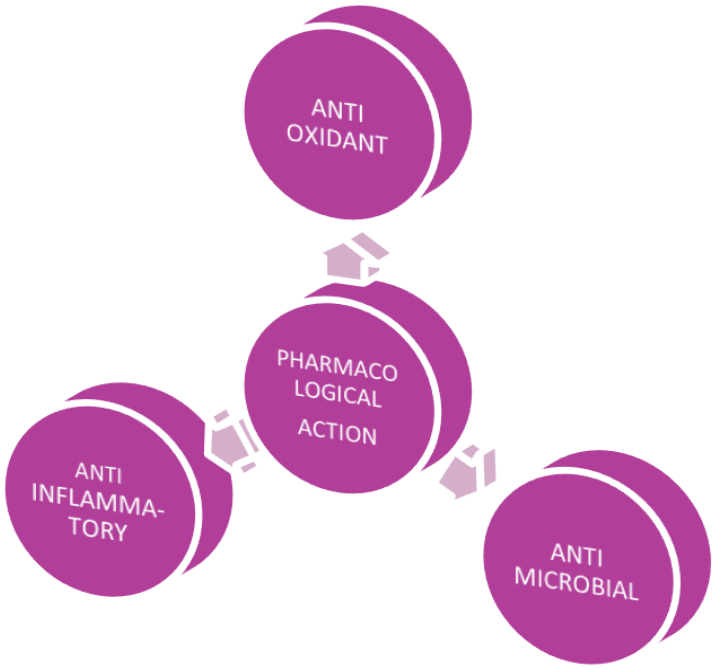


Figure 4: Figure representing the Phytochemicals having Antioxidant Action

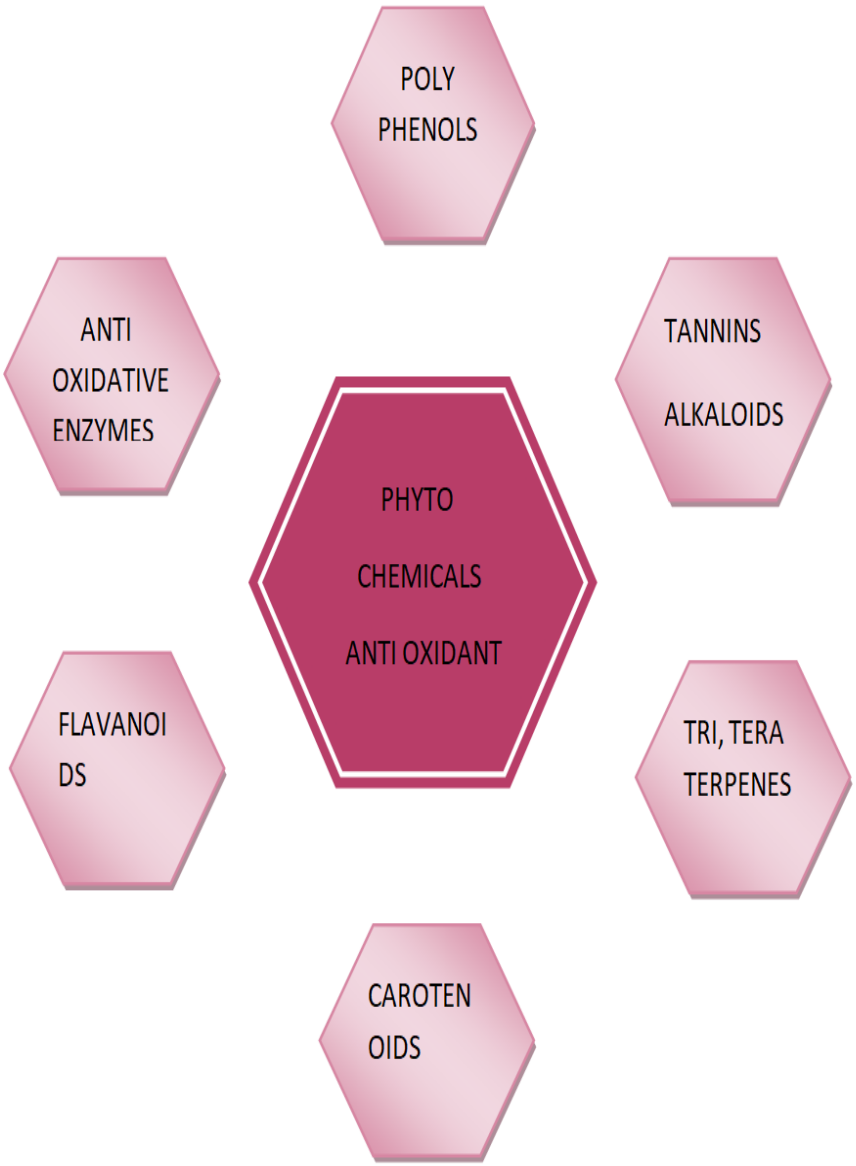

POLY PHENOLS
ANTI OXIDATIVE ENZYMES
TANNINS
ALKALOIDS
PHYTO CHEMICALS
ANTI OXIDANT
FLAVANOI DS
TRI, TERA TERPENES
CAROTEN OIDS

Figure 5: Figure representing the Mechanism of eye diseases and its required Phytochemicals