ISSN (O): 2349-5332
CODEN: IRJPHY

# POLYHERBAL FORMULATION AND EVALUATION OF DARUHARIDRA AND YASTI MADHU FOR DRY EYE DISEASE

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**Submitted on:** 21.03.2023; **Revised on:** 26.03.2023; **Accepted on:** 13.04.2023

**ABSTRACT-** Despite progress in determining the etiology and pathogenesis of dry eye syndrome, current knowledge remains inadequate, and no preventive strategies have been found. The present-day management strategy of dry eye syndrome though clinically effective, poses certain limitations. Preservatives used in formulations are known to cause dry eyes. The tear stimulants such as cholinergic drugs increase the tear production from lachrymal gland by stimulating secretions, but not been used in clinical practice. All these drugs donot have any effect on basic pathophysiology and they provide only symptomatic relief. Topical antibiotics and corticosteroids are sometimes used to treat secondary infections and inflammation. But discontinuation of antibiotics, steroids, and all preservative- containing eye drops is mandatory for relief of symptoms and progressively improving the tear film and ocular surface. Moreover, the most common therapy for dry eye syndrome, artificial tears, provides only temporary and incomplete symptomatic relief. Hence, identification of modifiable risk factors for dry eye syndrome may suggest avenues for investigation of novel preventive and treatment measures.

**KEYWORDS-** Dry Eye Syndrome (DES), Daruharidra, Yasti Madhu, Polyherbal Formulation, lacrimal gland

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Indian Research Journal of Pharmacy and Science; 34(2023)2851-2863;
Journal Home Page: https://www.irjps.in

**INTRODUCTION-** Dry Eye Syndrome (DES) is a multifactorial disease of the tears and ocularsurface that results in symptoms of discomfort, visual disturbance, and tears film instabilitywith potential damage to the ocular surface. It is accompanied by increased osmolality of thetear film and inflammation of the ocular surface. Based on the path physiology of tear filmformation the classification of DES suggested by Holly and Lemp comprise Aqueous TearDeficiency (ATD); Lacrimal surfactant(mucin) deficiency; Lipid layer abnormality; Impaired lid function or blinking; and Epithelio-pathy.

The Latin phrase 'kerato-conjunctivitis sicca'(KCS) indicates dryness and inflammation of thecornea and conjunctiva.There are many conditions which cause drynessof the eyes such ashypo function of lacrimal glands, mucin deficiency,conjunctival scarring etc**.** Although thetypical patient of dry eyes is elderly or suffers from auto-immune disease,increasing numberofpatientsdonotfitthisprofile.

Younger patients who work with computers can suffer from dry eyes more often than elderlypatients. Dry Eye conditions is also aggravated in polluted conditions, dry weather, decreased ambient humidity as seen with air conditioning and indoor heaters. Ocular surface diseases can result from the abnormalities in one or more of the tear film components, ocular or systemic diseases, various drugs and even environmental factors.

Dry Eye Syndrome is a leading cause of ocular discomfort affecting millions of people. DryEye conditions are a spectrum of disorders with varied etiology ranging from mild eyestrain tovery severe dry eyes with sight threatening complications. DryEye Syndrome is the mostcommon eye disease, affecting 5 - 6% of the population. Further it became a significant public health problem distributed among 10% of the adult population and 18% of the elderly population.

Ayurvedic literatures recount Dry Eye Syndrome (DES) or 'kerato-conjunctivitis sicca'(KCS) as *Shushkakshipaka, Parishuskha-netra, Ativishuskha-netra, Asrusravarahita-netra* and *Asnigdha-netra* indicative of dryness of eye due to deficiency in tear film components.

**Classical Review:** In certain conditions, there is insufficiency of lubrication of eye and theconjunctiva becomes dry. Deficiency in any components of tear film, results in dryness of theeye, due to the appearance of dry spots on the corneal and conjunctival epithelium. Ayurvedicliteratures vividly describe the conditions leading to dry ness of eye and recognized the role oftear components in maintaining surface ocular health. The role of *vata* and *pitta* doshas hasbeen clearly dealt in the pathogenesis of the condition in different texts. Further, Ayurvedic texts clearly narrated several extrinsic, intrinsic, environmental factors including diet and lifestyle related attributes leading to causation ocular disease, the comprise;

- Sudden plugging into cold water after exposing oneself to Sun.
- Looking for a long time at distance objects.
- Constant looking at too minute objects.
- Improper sleeping habits such as day sleeping and night awakening.
- Exposure to dust, smoke, etc.
- Suppression of physiological urges like vomiting
- Excessive physical exertion
- Excessive exposure to fomentation
- Excessive smoking
- Social pathological factors such as worrying, anxiety, stress, strain, emotionless.
- Unpleasant lasting environmental situations.
- Excessive sexual indulgence

**Modern Review:** Kerato-conjunctivitis sicca (KCS), or dry disease, is one of the most common complaints seen by ophthalmic specialists. In the current scenario of ageing population and increasing environmental factors it is becoming evenmore prevalent. Dry eye is not a trivial complaint. The symptoms cause significant discomfort and substantially reduce the sufferer's quality of life.

**Definition of dry eye disease:** The modern definition of dry eye disease is based on the concept of the three layers of the tear film devised by Holly and Lamp. Also, secondary factors such as pathological changes to the eyelids, cornea, or conjunctiva, can themselves disturb the normal function of the tear film. Neurotransmitters, hormones, and immunological processes play an important role in the regulation of tear production by the lacrimal gland.Various environmental factors like contact lenses, pollution, working at video display terminals can affect the tear film.

This multiplicity of causes and effects makes a global definition difficult. However, the following definition has been proposed: Dry eye is a disease of the ocular surface attributable to different disturbances of the natural function and protective mechanism of the external eye, leading to an unstable tear film during the open eye state. Recent studies have shown that immunologic changes play a role in the pathogenesis of the dry eye evening post infectious andage-related conditions. In addition to the term dry eye, which is established worldwide, the term ocular surface and tear disorder has been suggested.

**Clinical Anatomy and Physiology:** The lacrimal system produces a tear film that allows the ocular surface to function normally. A smooth, refractive surface and resistance to disease depend on a healthy tear film.

**Secretory System:** Tear Secretion comes from the lacrimal gland. The efferent nerve supply to the lacrimal gland is cholinergic. Drugs that inhibit cholinergic activity, therefore, inhibit tear secretion and often cause dry eye syndrome. Perhaps more important to maintenance of the tear film are the basic secretors. The three-layer tear film has numerous contributors. The sebaceous Meibomian glands produce the outermost lipid layer. The glands of Zeiss at the palpebral margin of each eyelid and the glands of Mollat the roots of the eyelashes also contribute to this layer. The accessory lacrimal glands of Krause and Wolfing are responsible for producing the middle layer of the tear film. The inner layer of the tear film is a mucoid layer of polysaccharide (sialo mucus) derived primarily from the conjunctival goblet cells located in the fornixes. Also contributing to this layer are the tarsal crypts of Henle and limbal glands of Manzo. The basic secretors together produce the continuous flow of tears that bathe the globe. They have no confirmed afferent nerve supply, and their output decreases with age.

**Distribution System:** The distribution system for the tear film consists of the eyelids and thetear meniscus along the lid margins in the open eye. Each blink compresses the superficial lipidlayer. The mucous layer acts as a scavenger to pick up any lipid containing debris and carry itto the fornixes. As the eyelid reopens, a new tear–film layer is spread across the ocularsurface. Inadequacy of any layer of the tear film increase its instability and may accelerate tear breakup time (BUT).

**Excretory System:** Blinking is an important factor in tear distribution and also plays a pivotalrole in tear drainage. Crucial to proper lacrimal excretory function is the punctum, the entrypoint for lacrimal drainage. Proper tear elimination requires that the punctum be opposed to theglobe. Spontaneous

blinking replenished the fluid film by pushing a thin layer of fluid ahead ofthe lid margins as they come together. The excess fluid is directed into the lacrimal lake - asmall triangular area lying in the angle bound by the innermost portions of the lids. Tears are drained from the lacrimal lake by the lacrimal canaliculi via the nasolacrimal duct, and thendrained over the nasopharynx and oropharynx to be swallowed. The drainage pathway may account for up to 90% of the fate of tears. The remainder evaporates. Thus, the act of blinking exerts a suction – free force action in removing tears from the lacrimal lake and emptying them into the nasal cavity.

**Tear Fluid Composition:** The tear fluid is found to be composed of three protein fractions: albumin, globulin, and lysozyme. The immunoglobulins found in normal tear fluid are IgA, IgGand IgE. IgA predominates in the secretory form, IgE levels increase in patients with allergic conjunctivitis, and IgM is found in tears of patients with acute infections.

## MATERIALANDMETHODS

### Pharmaceutical development and Standardization

**Raw drug identification and quality assurance:**Raw ingredients viz.dried unpeeled stolon and root of *Yastimadhu* (*Glycyrrhiza glabrla* Linn.) and dried stem of *Daruharidra*(*Berberis aristata* DC.) procured from authentic market sources**.** The identity was confirmed with compliance of microscopic, macroscopic parameters of Ayurvedic pharmacopoeia of India (API) through pharmacognosy studies. The purity and strength were also confirmed through Physico-chemical studies done as per 'Protocol For Testing of ASU Drugs, Pharmacopeial Laboratory for Indian Medicine, Ministry of AYUSH, Govt. India and compliant with parameters of Ayurvedic pharmacopoeia of India (API).

**Fig.1-Samples of ingredients of Eye Drops**

***Daruharidra* (*Berberis aristata* DC.)**

***Yastimadhu* (*Glycyrrhiza glabrla* Linn.)**

### Pre-Clinical Studies

The pre-clinical studies include various steps involved in drug development which are essential to comply with the requirements of the quality, safety and efficacy viz. pharmaceutical development and standardization, in-vivo ocular safety, and toxicity studies; *invitro* antimicrobial assays and biochemical assessment of antioxidant potential of eye drops which are contributory to inclusive approach in the management of dry eye

syndrome.

**Materials and Methods:** Determination of antioxidant potential was done adopting the following In*vitro* biochemical assays.

**Inhibition of Nitric oxide radical:** Nitric oxide generated from sodium nitroprusside in-aqueous solution at physiological pH interacts with oxygen to produce nitrite ions. This was measured by the Griess reaction (Greenetal.,1982; Macrocyteal.,1994). The reaction mixture (300µl) containing sodium nitroprusside (10 mM) in phosphate buffered saline (PBS) and eye drops and the reference compound in different concentrations (10, 25, 50,75 and 100 µg) were incubated at 25°C for 150 min. Each 30min, 50µl of the incubated sample was removed and 50µl of the Griessreagent (1% sulphadiazine, 0.1% naphthyl ethylene diamine hydrochloride in 2% $H_3PO_4$) were added. The absorbance of the chromophore formed was measured at 546 nm on ELISA plate reader (Bio-Tek). All the tests were performed in triplicate and the results averaged. The percentage inhibition of nitric oxide generated was measured by comparing the absorbance values ofcontrol and test samples. Ascorbic acid served as a positive control compound (Green LC,Wagner DA, Grotowski J, Skipper PL, Wishna JK, Tannenbaum SR. (1982). Analysis of nitrate, nitrite and 15N in biological fluids. Anal Biochem, 126: 131-136.; Marcocci L, MaguireJJ, Droy-Lefaix MT, Packer L. (1994). The nitric oxide scavenging property of *Ginkgo biloba* extract EGb761. Biochem Biophys Res Commun, 201:748-55.)

**ABTS radical cation decolorization assay:** In this assay, the oxidantis generated by per-sulfate oxidation of 2, 2,-azinobis (3-ethylbenzoline-6-sulfonic acid) - ($ABTS^{2-}$) as described by Re et al., (1999). ABTS radical cation ($ABTS^{+}$) are produced by reacting ABTS solution (7mM) with 2.45 mm ammonium per sulphate and the mixtures were allowed to stand in darkat room temperature for 12-16 hr before use. After 16hr, this solution was diluted with ethanol until the absorbance reaches 0.7±0.02 a 734 nm. For the study, 100µl of eye drops (120µg/ml) were added to 200µl of ABTS solution. The absorbance was read at 745nm and the percentage inhibition calculated. (ReR, Pellegrini N, Protogenetic A, Panela A, Yang M, Rice-Evans C.(1999). Antioxidant activity applying an improved ABTS radical cation decoloration assay. Free Radic BiolMed,26:1231-1237.)

**InhibitionofDPPHradical:**The free radical scavenging activity of eye drops was measured by 1; 1-diphenyl-2-picryl-hydrazil (DPPH) uses the method of Blois (1958) and Gomez-Alonso et al., (2003). 0.1 mM solution of DPPH in methanol was prepared and 100 µlof this solution was added to 100 µl of eye drops and the reference compound (50, 100, 150,200 and 250 µg). After 30 min, absorbance was measured at 517 nm. Butylated HydroxyAnisole (BHA) was used as the reference material. The percentage of inhibition was calculated by comparing the absorbance values of the control and test samples.(Gomez-Alonso S, Frangipane G, Salvador MD, Gordon MH. (2003). Changes in phenolic composition and antioxidant activity of virgin olive oil during frying. JAgricFoodChem,51: 667-672.)

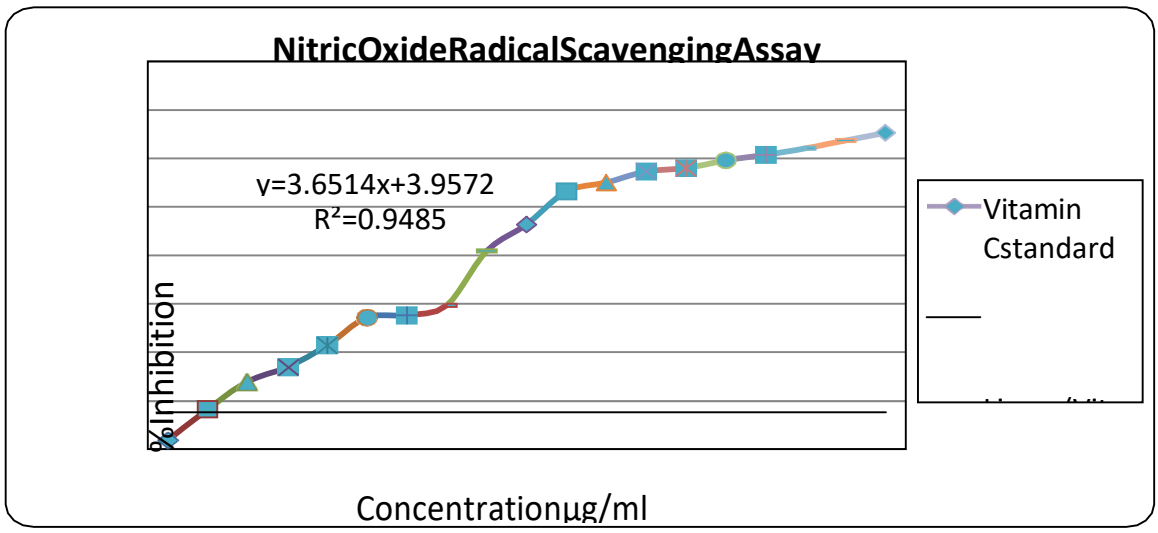
**Reducing power/Ferric reducing antioxidant potential (FRAP) assay:** The reducing power of eye drops was determined according to the method of Oyaizu (1986). 100 µl of eye drops were mixed with phosphate buffer (0.2M, pH6.6) and potassium ferric cyanide [K3Fe(CN)6] (1%). The mixture was incubated at 50ºC for 20min. A portion of trichloro acetic acid (10%) was added to the mixture, which was then centrifuged at 3000g for 10 min. The upper layer of the solution (100 µl) was mixed with distilled water (50µl) and

Ferric chloride ($FeCl_3$) (100 µl, 0.1%) and the absorbance was measured at 700 nm. Butylated HydroxyToluene (BHT) was used as the reference material.

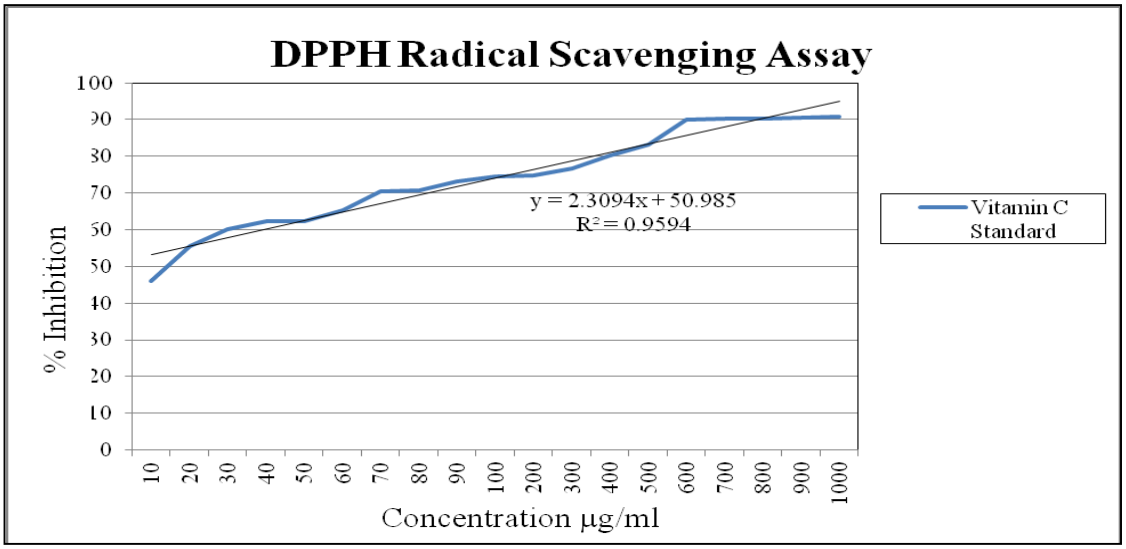
All the tests were performed in triplicate and the graph was plotted with the average of three observations. (Blois MS. (1958). Antioxidant determinations using a stable free radical.Nature, 181: 1199-1200.; Oyaizu M. (1986). Studies on product of browning reaction prepared from glucose amine.

**Results and discussion: In** vitro biochemical antioxidant assays such as Nitric oxide radical scavenging assay, ABTS radical scavenging assay, DPPH radical scavenging assay and Ferric reducing antioxidant potential (FRAP) assay have confirmed the antioxidant potential of theeye drop. The Inhibitory Concentration ($IC_{50}$) obtained from the standard graphs of variousassays are expressed in terms of their standard compounds **(Table-1) (Graph-1, Graph 2,Graph.3)**

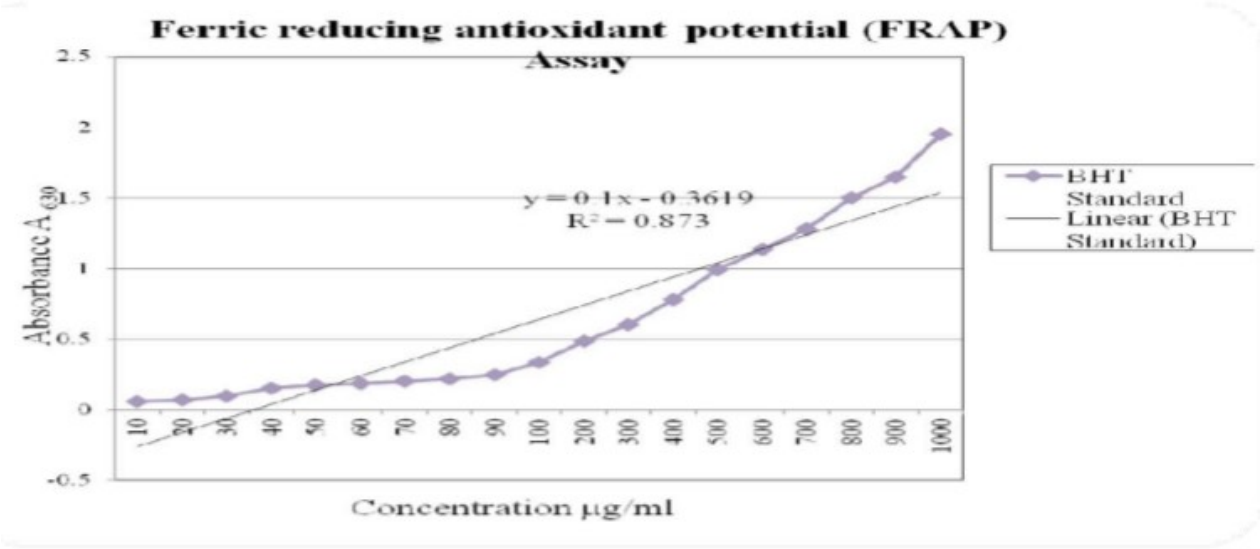
**Graph1: Nitric oxide radical scavenging assay obtained with vitamin C standard**




**Graph2. DPPH radical scavenging standard assay obtained with vitamin C standard.**



**Graph3: FRAP standard assay obtained with BHT standard**




**CONCLUSION:** In addition to the management of symptoms related to deficiency of tear components, prevention of damage due to oxidative stress, arrest of further progress and control of infection also forms an vital component in dry eye disease. The close relationship between ocular surface epithelia and the preocular tear film ensures ocular surface health. As such, dysfunctional protective elements that lead to ocular surface and tear disorders are heterogeneous, effective therapeutic strategies are the need of hour to tackle tear disorders attributed with diverse factors. The ocular toxicity studies of standardized herbal eye drops revealed its safety on topical ophthalmic use. Further the antioxidant and anti-microbial property may contribute to effective symptom management and extenuation of basic pathology linked with tears component deficiency. The eye drops developed rationally taking potential leads from codified Ayurvedic texts probably contribute by offering comprehensive management for dry eye syndrome.

**ClinicalStudies**

The Clinical study is an interventional, randomized control, open label prospective trial with efficacy as the end point. Additionally the safety aspects viz. ADRs –(Adverse Drug Reaction) and AEs (Adverse Events) have documented. The study was designed and outcome of end points such as clinical symptoms, subjective parameters and other diagnostic tests have been subjected to Uni-variant and multi variant analysis using Statistical Package for Social Sciences (SPSS) 15.0 version with appropriate statistical methods. The scoring of criteria of assessment was analyzed statistically in terms of mean value of BT (before treatment), AT(after treatment), SD (standard deviation), SE (standard error). Paired t test was applied for test of significance at$P<0.05$ and $P<0.001$**.** The study was conducted at Ayurveda Central Research Institute, NewDelhi, after obtaining clearance of IEC (Institutional Ethics Committee) and registration of CTRI (Clinical Trial Registry of India).

**MaterialsandMethods**

**Objectives**

To evaluate the clinical efficacy of 'DY Eye drops' {prepared with *Daruharidra* (*Berberis*

*aristata* DC.) & *Yastimadhu* (*Glyeyrrhiza glabra*Linn.) in Dry EyeS yndrome *(Shushkakshipaka*)

To compare the efficacy of 'DY Eye drops' with Artificial tears (conventional control intervention- Tear supplement - Carboxy methyl cellulose)

**DrugInterventions**

**Group-I**: Installation of 'DY Eye drops' {{prepared with *Daruharidra* (*Berberis aristata*DC.) & *Yastimadhu* (*Glyeyrrhiza glabra* Linn.) three drops for three times a day for onemonth

**Group-II:** Installation of 'Artificial tears (conventional Control -Tear supplement- Carboxy methyl cellulose) three drops for three times a day for one month.

**StudyParticipants InclusionCriteria**

1. Subjects of both the gender aged between 35 to 70 years.
2. Patients presenting with any of the signs and symptoms of Dry eye syndrome viz Feeling of dryness in the eyes, burning sensation, foreign body sensation (Sandy/Scratchy /itching), pricking pain, Rough lids / mucoid discharge/mild blepharitis ,stuck eyelids, blurred vision, redness) with

- Schirmer-Itest positivei.e.<10mm.
- Tear film break-up time less than 10 seconds.

**Assessment**

1. **PrimaryOutcomeMeasure**

- Change in Clinical Parameters-

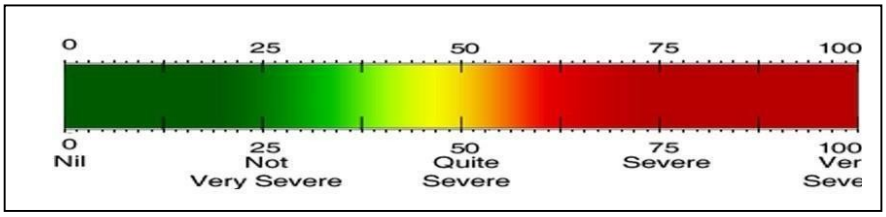
2. **SecondaryOutcomeMeasures**

- Change in the Tear Film breakup time
- Change in Schirmer- I Test
- Change in Rose Bengal Staining.

**AssessmentParameters**

(1)**ClinicalParameters**

**VisualAnalogueScale**




**ParametersVisualanalogueScaleScore**

a) Feeling of Dryness in the eyes

b) Burning sensation

c) Foreign body sensation (Sandy/Scratchy/itching)

d) Pricking pain

e) Roughlids/Mucoid discharge/ Mild Blepharitis

f) Stuckeyelids

**g)** (2) **EyeTests:**

➢ Tear Film breakup time_____sec.

➢ Schirmer's, ITest_____mm

➢ Rose Bengal Staining

**Criteriafor assessmentof the outcome:**

Grading and scoring pattern was adopted for assessing following criteria before and after intervention phase.

a. Subjective presence of symptoms (Progression or regression) as per VAS

**1. Objective presence of signs (Progression or regression).**

Following system of grading was used for recording the irreadings:

**1. Schirmer I test**

1 - Schirmer strip wetting of>15m min 5minutes
2 - Schirmer strip wetting between11-15m min 5 minutes
3 - Schirmer strip wetting between5-10m min 5minutes
4 - Schirmer strip wetting of< 5m min 5minutes

**2. Tear film Break UpTime**

1 - The appearance of dry spot after15seconds
2 - The appearance of dry spot between11-15sceonds
3 - The appearance of dry spot between 5-10 seconds
4 - The appearance of dry spot within 5 seconds

**3. Rose Bengal staining (Oxford scheme of scoring)**

0 - Nostaining.
1 - Mildstaining. (Dotcount10)
2 - Moderatestaining(Dotcount32)
3 - ModeratelySeverestaining(Dotcount100)
4 - Intensestaining(Dotcount 316)

**C**
**I**

i. TBUT: Increase or decrease in tear film breakup time

ii. Rose Bengal staining: Absence, decrease or increase in conjunctival and corneal staining.

**4. WithdrawalCriteria**

The participant may be withdrawn from the trial if –during the trial treatment, if any serious condition develops/symptoms aggravate, which requires urgent treatment, necessitating the institution of new modalities of treatment.

**Statistical Methods:** Clinical symptoms, Subjective parameters and clinical test outcomes behad been subjected to Univariate and multivariate analysis using Statistical Package for Social Sciences (SPSS) The scoring of criteria of assessment was analyzed statistically in terms of mean value of BT (before treatment), AT(after treatment), SD (standard deviation), SE (standard error). Paired t test was applied for test of significance at $P<0.05$and$P<0.001$.

**Adverse Events:** Any untoward medical occurrence that may present during the treatment with a pharmaceutical product but which does not necessarily have a causal relationship with this treatment.

**ObservationsandResults**

**1. Observations**

**Enrollment and adherence of study participants:** 150 enrolled participants were randomly distributed into 2 groups, **Group-1 (DY-Drops) and Group-II standard control (Carboxymethyl cellulose)** each comprising of 75 subjects. Out of 150 recruited eligible participants, 138 (92%) subjects completed the study and there were 12 (8%) dropouts. In Group-I, 67 participants completed the study and 8 were dropouts while in Group-II, 71 completed the study with 4 dropouts.

**Table-1. Details of Enrolled and Completed Study Participants in Treated and control Groups**

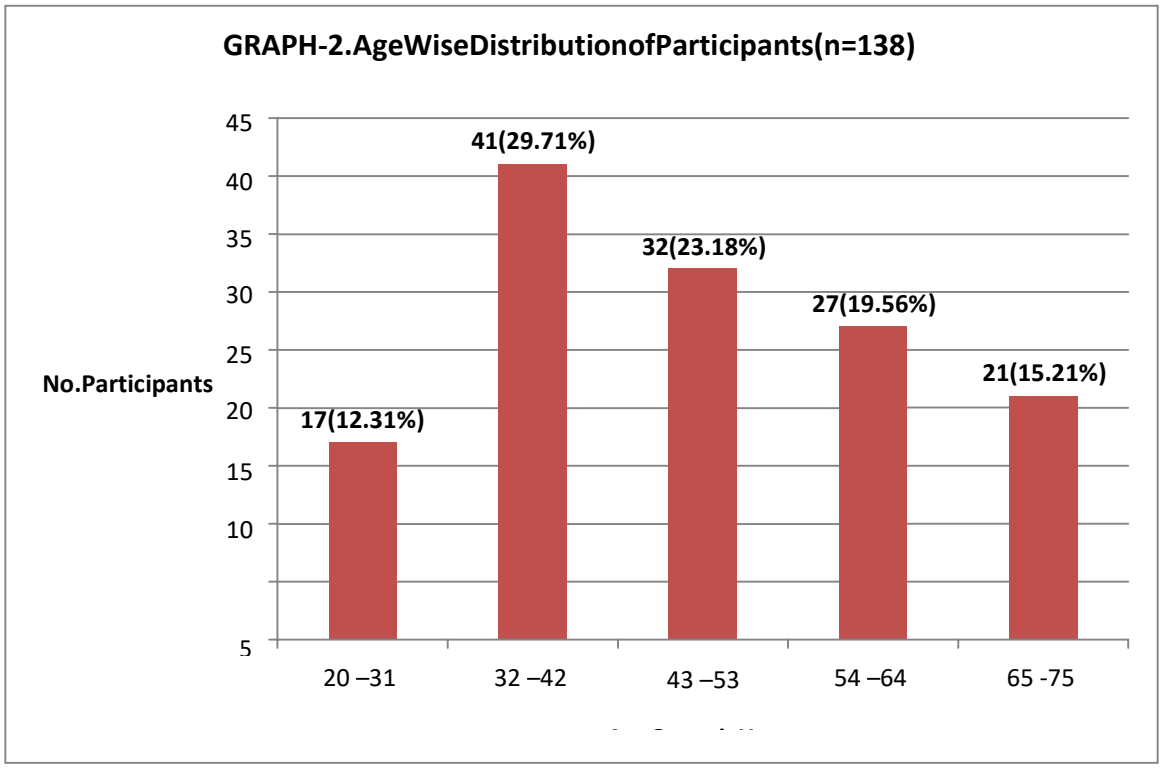
| Trialgroups | Enrolled Cases | Dropouts | Completed Cases |
|---|---|---|---|
| **GroupI (TreatedGroup)** | 75 | 8 | 67 |
| **Group II (StandardControl)** | 75 | 4 | 71 |
| **Total** | **150** | **12(8%)** | **138(92%)** |

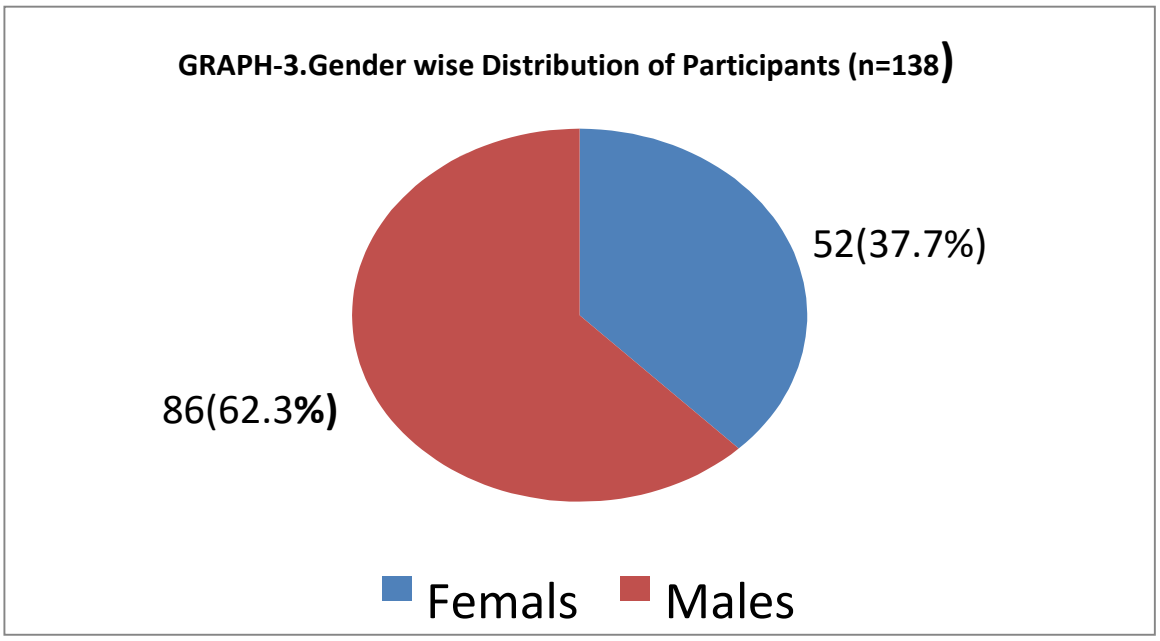
**Demographic Profile:** The demographic data has been presented for 138 participants where as clinical examination findings have been detailed for individual eye amounting to 276 eyes. The demographic data was collected and grouped on the basis of various parameters such as age, gender, prakriti, religion, educational status, dietary habits, addictions etc.

**Age and Gender:** Maximum numbers of participants were in present study belonged to age groups of 32-42 years (29.71%) and 43-53 (23.18%) accounting for 52.89% of the total 138 registered participants followed by participants belonging to age group 54- 64years (19.56%). In present study, 37.7% participants were females and 62.3% % participants were males. ((**Table-2, Graph-2 and Graph-3)**

**Table-2: Age and Gender wise distribution of completed participants**

| Agegroup | Gender wise Distribution of Participants (Number) | | Total | Percentage |
|---|---|---|---|---|
| | Female | Male | | |
| **20-31** | 5 | 13 | 17 | 12.31 |
| **32–42** | 13 | 28 | 41 | 29.71% |
| **54–64** | 15 | 12 | 27 | 19.56% |
| **65–75** | 10 | 11 | 21 | 15.21% |
| **Total** | **52** | **86** | **138** | **100%** |
| | **37.7%** | **62.3%** | **100%** | |






**Work profile and Occupation:** The work profile and occupation comprise of 56.52 % (78) of the participants belongs to service group 31.8% (43) were house makers followed by 12.31% (17) were engaged in business. The socio-economic status of participants reveals that 10.9% (15) of participants possess BPL cards while other 89.1% (123) falls either in middle and higher economic status.

**Disease course:** Concerning the onset and course of symptoms, 90.75% (125) participants had chronic and recurrent nature of the dry eye while 9.42% (13) presented with acute onset.

**Dietary profile**: Further the dietary profile of participants reflects vegetarian predominance with 59.42% (82) while 40.57% (56) had mixed diet habits.

**Visual acuity:** Observations of Visual acuity of participants comprise 6/6 in 9.42% (13),, 6/9 in 23.91% (33) 6/12 in 18.84% (26), 6/18 in 11.59% (16), 6/24 in 19.56% (27), 6/36 in 10.14% (14) and 6/60 or less was observed in 6.51% (9) participants.

**Discussion and Conclusion**

The under mentioned discussion substantiate the role of the current Ayurvedic trial intervention- 'DYEye drops' prepared with Daruharidra (*Berberis aristata* DC.) & Yastimadhu (*Glyeyrrhiza glabra* Linn.) in the effective management of Dry Eye syndrome.

Scientific Rational: Effective management of Dry eye syndrome calls for all- inclusive approach to address and tackle under lying pathology, precipitating and management of symptoms

Despite progress in determining the etiology and pathogenesis of dry eye syndrome, current knowledge remains inadequate, and nopreventive strategies have been found. The present-day management strategy of dry eye syndrome though clinically effective, posses certain limitations. Preservatives used in formulations are known to cause dry eyes. The tear stimulants such as cholinergic drugs increase the tear production from lachrymal gland by stimulating secretions, but not been used in clinical practice. All these drugs donot have any effect on basic pathophysiology and they provide only symptomatic relief. Topical

antibiotics and corticosteroids are sometimes used to treat secondary infections and inflammation. But discontinuation of antibiotics, steroids and all preservative- containing eye drops is mandatory for relief of symptoms and progressively improving the tear film and ocular surface. Moreover, the most common therapy for dry eye syndrome, artificial tears, provides only temporary andincomplete symptomatic relief. Hence, identification of modifiable risk factors for dry eye syndrome may suggest avenues for investigation of novel preventive and treatment measures film is stable, to lubricate the eye lids, to supply atmospheric oxygen to corneal epithelium and it has anti-bacterial enzymes; laysozyme and lactoferin**.** The disturbance in the functional components of *tarpaka-kapha* or pre-corneal layers leads to dry inflammation of the eye or *Shushkakshipaka,* Ayurvedic literatures recount potential ophthalmic drugs for the management of surface inflammatory conditions of eye such as *sushkashipaka* or *parisushkanetra* a comparable with dry eye syndrome (DES) or Kerato-conjunctivitis Sicca (KCS). These plants are attributed with Pharmacological actions such as *caksusya* (conducive to vision), *netrya* (conducive to adnexa of eye), *netraruja-hara* (analgesic ophthalmic action), *netra-sodhahara* (anti-inflammatory action) *netrakanduhara* (antiallergic action),*vrana-ropana* (wound healing effect) supported by scientific evidences. With this rationale and background, an Ayurvedic eye drop was developed for dry eye syndrome (DES) systematically following appropriate methods and parameters right from quality assurance of ingredients, formulation of standard operation procedures (SoPs) and also complying to the quality and safety standards of finished product. Ayurvedic literatures recount Dry Eye Syndrome (DES) or 'kerato-conjunctivitis-sicca' (KCS) as *Shushkakshipaka, Parishuskha-netra, Ativishuskha-netra, Asrusravarahita-netra* and *Asnigdha-netra* indicative of dryness of eye due to deficiency in tear film components.

**1.** *Tarpaka-kapha*,one among the five varieties of *Kapha*, situated in head (*siras*) is responsible for the integrity of sense organs (*aksha-tarpana*). According to *Dalhana* the term *aksha* refers to sense organs such as eye. Collective function tear film components can be correlated with the function of the *tarpa-kakapha*

**2.** The disturbance in the functional components of *tarpaka-kapha* or pre-corneal layers leads to dry inflammation of the eye or *Shushkakshipaka,*

**3.** The most common therapy for dry eye syndrome, artificial tears, and other conventional approaches provides only temporary and incomplete symptomatic relief. Hence, identification of modifiable risk factors for dry eye syndrome may suggest avenues for investigation of novel preventive and treatment measures.

**4.** Ayurvedic literatures enumerate potential ophthalmic drugs for the management of surface inflammatory conditions of eye such as *Daruharidra* (*Berberis aristata* DC.) & *Yastimadhu* (*Glyeyrrhiza glabra* Linn).

**REFRENCE**

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CONFLICT OF INTEREST REPORTED: NIL; SOURCE OF FUNDING: NONE