

CRITICAL STUDY OF ARAGVADH (*CASSIA FISTULA LINN*) AND ASSESSMENT OF ITS ANTIOXIDANT ACTIVITY WITH SPECIAL REFERENCE TO DADRU (TINEA INFECTION)

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ABSTRACT

Tinea infection is one of leading skin Disease which affects 15-20% of population. Multiple factors responsible for tinea infection leads to oxidative stress due to which disease progress very fast. *Kuṣthaghna* and *sansrana* effect of *Aragvadh* (*Cassia fistula linn.*) can improve skin conditions of patients of tinea infection by decreasing symptoms and normalizing skin. Antioxidant present in *Aragvadh*. i.e. Total phenolic, Proanthocyanidin and flavonoid contents Prevents process of oxidative stress in tinea infection. open labeled study was done on 90 patients at Ayurved Mahavidyalaya, Sion, Mumbai, India for the duration of 60 days. Out of 90 patients, 30 patients were given *Aragvadh kwath*, 30 patients were given *Aragvadh kwath* and modern treatment, while 30 patients were given placebo and modern treatment. Weekly assessment was done on the basis of signs & symptoms like *Kandu* (Pruritus), *Raga* (reddish discoloration), *Mandala* (wheels), *Pidika* (vesicles), *sthana* (site), *Daha* (burning sensation), Scales. Objective improvement was done on the basis of MDA (Malondialdehyde), SOD (Superoxide dismutase), and GSH (Glutathione peroxidase) enzyme study for Antioxidant activity & Fungal smear at baseline and after 60 days. Statistical analysis was done by applying Anova Test to objective parameters: at baseline and at the end of study which is found to be highly significant in group B at 5% level of significance. i.e. $p < 0.05$. Subjective improvement is shown in percentage. It was observed that in Group B i.e. patients taking *Aragvadh phalamajja-kashaya* and modern treatment had excellent symptomatic relief i.e. 71.73%.

Keywords: Tinea infection, *Aragvadh*, Antioxidant Activity, *Cassia fistula linn*, MDA (Malondialdehyde), SOD (Superoxide dismutase), GSH (Glutathione peroxidase)

INTRODUCTION

India is fast developing nation with newer technologies. With globalization there is increased population and pollution,

health ignorance, increased hot and humid environment, lowering living status, unhygiene. Because of this there is marked increment in skin diseases mainly fungal infection, bacterial infection, allergies. In

Mumbai, especially hot weather, physical and mental stress, chemical industries worsen the condition. All these factors are responsible for Tinea infection.^[1] The modern treatment available for tinea infection gives only symptomatic relief without breaking the pathology and also give unnecessary side effects to the patients. oxidative stress is responsible for many disease including tinea infection. Free radicals are those which causes harm to body. These free radicals are involved in more than 50 diseases like diabetes mellitus, parkinson's disease, AIDS and Tinea infection. Those agents which lowers the burden of free radicals are known as antioxidants. The antioxidants enzymes include MDA(Malondialdehyde),SOD(Superoxide dismutase),and GSH(Glutathione peroxidase). These antioxidants enzymes neutralize many types of disease-causing free radicals, ridding the body of their harmful effects. MDA is an oxidative stress marker and hence decrease in MDA results in decreased oxidative stress. SOD and GSH are enzymatic and non-enzymatic defense system which increase on decrease in oxidative stress.^[2] Antioxidants by scavenging the free radicals which causes oxidative stress reduces the process of lipid peroxidation thus prevent further consequence on body. *Aragvadh* (*Cassia fistula linn.*) is used as *kuṣṭhagha* and *kandughna dravya* in various skin disease.^{[3],[4]} It is main *Sransrana dravya* which helps for *kaphapittavishodhana*.^[5] Due to *kaphapittavishodhana kuṣṭhagha karma* is carried out which plays a major role in tinea infection (*dadru*). Ayurvedic drugs like *shatavari*, *guduchi*, *gokshur*, *ashwagandha*, *pippali*, *amalaki*, *dadim*, *tulsi*, *haritaki*, *bibhitaki*, *ardrak*, etc. possess antioxidant properties and *Aragvadh* is one of them.^[6] *Aragvadh* (*Cassia fistula linn.*) is

natural source of antioxidants i. e. Total phenolic, Proanthocyanidin and flavonoid contents.^[7] The seven new bioflavonoids (1-7) & two triflavonoids (8 & 9) have been isolated from the flowers of *Aragvadh*.^[8]

MATERIALS AND METHODS

SELECTION OF CASES:-There was random selection of patients from opd and Ipd of R.v.Ayurved Hospital, sion, Mumbai, India. known case of Tinea infection were taken. Study was carried out as per Ethical Clearance Number-AMS/394/13-14

TYPE OF STUDY:-open labeled study.

TOTAL NO OF CASES :-90

DURATION OF STUDY : 60 Days

INCLUSIVE CRITERIA :

- ◇ Either sex.
- ◇ Age between 16-60years.
- ◇ Known case of tinea infection(*Dadru*) having sign and symptoms of fungal infection.
- ◇ Informed consent signed

EXCLUSIVE CRITERIA :

- ◇ Pregnant women & lactating Mother
- ◇ Patients with renal & hepatic dysfunction
- ◇ HIV-AIDS
- ◇ Other skin infection like Herpes zoster, psoriasis, eczema
- ◇ Diabetes mellitus
- ◇ Secondary skin infections

Patients will be divided in 3 groups as follows :

Group A : 30 cases- *Aragvadh* *Kaṣhaya*

Group B : 30 cases- *Aragvadh* *Kaṣhaya* and Modern treatment of tinea infection

Modern treatment for tinea infection is mainly Fluconazole 150mg once in a week for 4 weeks and clotrimazole (1%) for local application.

Group C : 30 cases- Placebo and Modern treatment of tinea infection

Placebo capsules were containing 100mg of starch powder.

DRUG SOURCE : Phalamajja of Aragvadh (Cassia Fistula Linn.)

The Phytochemical Analysis of fruit pulp of Aragvadh (cassia fistula linn) was done with the help of Shree Dhootpapeshvar ltd., Mumbai, India. The obtained values were in accordance with the Standards Ayurvedic Pharmacopeia of india values.^[9]

FORMULATION:Decoction (Kashaya)^[10]

PREPARATION OF ARAGVADHA KASHAYA:-

Taken 20gm of fresh fruit pulp of Aragvadh (Cassia fistula linn.) in pot. Add 320ml water (about 8cups) in fruit pulp. Then keep pot on Gas (Mandagni). When 40ml of water get remained, close the gas. Then keep it for 10mins to cool down the decoction. Then filter the decoction Every time fresh decoction is prepared for use & drink within half hour.^[11]

MODE OF ADMINISTRATION: Oral and local application^[10]

DOSE: 40ml

KAL: Twice a day & Dhavana twice a day

ANUPAN: Koshnodak

FOLLOW UP: 7 days after every visit for 60 Days.

STATISTICAL TEST:-

Statistical analysis was done by applying Anova Test (F-Test) to objective parameters: at baseline and at the end of study (after 60 days). Subjective improvement has shown in percentage.^[12]

ASSESSMENT OF EFFICACY

1) Subjective improvement:

a) General & systemic examination of patients at every 7 days

b) Weekly assessment in reduction of following symptoms.

1) *Kandu* (Pruritus)

2) *Raga* (reddish discoloration)

3) *Mandala* (wheels)

4) *Pidika* (vesicles)

5) *sthana* (site)

6) *Daha* (burning sensation)

7) Scales

2) Objective improvement

1) Fungal smear at initial and then after 30 days.

2) For Antioxidant Study:- MDA, GSH and SOD enzyme study.

GRADATION OF SYMPTOMS:-

1. *Kandu* (Pruritus)

0- Absent

1- Occasionally

2- Occurs at particular time

3- Continues, Sleep disturbance

2. *Raga* (Reddish discoloration)

0- Absent

1- Slightly red

2- Redness at center increasing centrifugally

3- Whole wheel get red.

3. *Mandal* (Wheel)

0- Absent

1- Less than 4 cm in diameter

2- More than 4 cm, but less than 7 cm in diameter

3- More than 7 cm in diameter

4. *Pidika* (Vesicle)

0- Absent

1- Very rare

2- One or two at border of wheel

3- Multiple vesicle at margin of wheel

5. *Sthana* (Site)

0- Absent

1- Limited to only one part (only to foot or buttocks or face or arm or groin or other part)

- | | |
|---|---|
| <p>2- Limited to two part (To face and arm or to groin and buttocks etc.)</p> <p>3- On many body part (To groin, face, buttocks, arm, foot grossly involved.)</p> <p>6. Daha (Burning Sensation)</p> <p>0- Absent</p> <p>1- Occasionally</p> | <p>2- Occurs at particular time</p> <p>3- Occurs every time</p> <p>7. Scales</p> <p>0- Absent</p> <p>1- Occasionally</p> <p>2- Occurs on Itching</p> <p>3- Occurs every time</p> |
|---|---|

RESULT:-

SYMPTOMATIC RELEIF OBTAINED WITHIN GROUPS :

Table 1

MEDICINE GIVEN	NO OF PA-TIENTS	SYMPTOMWISE RELEIF (%)	PATIENTWISE RELEIF (%)
<i>Aragvadh Kaṣhaya</i>	30	57.94	58.24
<i>Aragvadh Kaṣhaya</i> and Modern Rx for TI	30	71.73	72.03
Placebo and Mod-ern Rx for TI	30	65.11	67.41

SYMPTOMS	GROUP A (%)	GROUP B (%)	GROUP C (%)
<i>Kandu</i>	60.14	70.22	68.34
<i>Raga</i>	60.54	75.63	73.82
<i>Mandala</i>	59.23	70.56	62.67
<i>Pidika</i>	54.91	67.33	62.23
<i>Sthana</i>	52.12	71.97	61.06
<i>Daha</i>	65.32	74.34	71.5
<i>Scales</i>	56.11	67.12	61.12

AVERAGE RESULT IN PERCENTAGE RELEIF WITHIN THE GROUPS Table 2

COMPARATIVE DIFFERENCE IN PERCENTAGE OF RELEIF WITHIN THE GROUPS

Table 3

INVESTIGATIONS	GROUP A (%)	GROUP B (%)	GROUP C (%)
MDA	39.54	54.76	44.54
GSH	34.43	55.91	42.67
SOD	42.39	57.11	48.81
FUNGAL SMEAR	57.12	74.16	65.49

STATISTICAL ANALYSIS OF FUNGAL SMEAR RESULTS EVALUATED USING PAIRED T TEST Table 4

Fungal Smear	BT	AT	X	SD	SE	t-val
Group A	24	11	0.43	0.50	0.09	4.66

Group B	24	6	0.6	0.49	0.09	6.67
Group C	23	08	0.50	0.51	0.09	5.77

Result : Thus statistical test in group A ,group B and group C is found to be significant for Fungal smear at 5% level of significance.i.e. p<0.05.

NS – Non significant; BT – Before treatment; AT – After treatment

X – Mean; SD – Standard Deviation; SE – Standard error.

STATISTICAL ANALYSIS OF PHYSICAL PARAMETERS RESULTS EVULATION

USING ANOVA TEST Table 5

	Degree of freedom	Sum of squares	Mean sum of squares	F – Ratio / F value
MDA				
Between the groups	2	132.53	73.41	18.87**
Error	87	203.46	3.89	
GSH				
Between the groups	2	13789.76	6741.91	848.03**
Error	87	356.32	7.95	
SOD				
Between the groups	2	4.43	2.06	22.88**
Error	87	5.03	0.09	

** - Highly significant

Result: The values for all the above objective parameters are found to be highly significant at 5% level of significance.

DISCUSSION

Human body in this modern world suffering from continues hammering of physical and mental stress. Tinea infection and its complications are such type of diseases, which causes because of misuse and abuse of body. These factors can under control of human being by its psychological education, changing to good habits and proper hygiene. Out of 90 patients 55(61.11%) were male and 35(39.89%) were female. Agewise categorization showed that 16-26 years were 18(20%), 27-36 years were 30(33.33%), 37-46 years were 30(33.33%), 47-60 years were 12(13.33%). According to physical activity, 19(21.11%) were heavy workers, 53(58.88%) were moderate workers and 18(20%) were sedentary. According to environment, 61(67.77%) were in normal

weather, 22(24.44%) were in hot weather and 7(7.77%) were in cool weather. Out of 90 patients, 32(35.55%) were vegetarian and 58(64.44%) were mixed. According to *dehaprakruti*, 34(37.77%) were *Vatakapaja*, 25(27.77%) were *Vatapittaja* and 31(34.44%) were *kaphapittaja*. According to *agni*, 29(32.22%) were *vishamaagni*, 20(22.22%) were *tikshna agni*, 41(45.55%) were *mandaagni*.

Subjective evaluation showed that Improvement in *Kandu* is 60.14% in group A, found to be significant at 5% level; 70.22% in group B, found to be significant at 5% level; 68.33% in group C found to be significant at 5% level. Improvement in *Raga* is 60.54% in group A, found to be significant at 5% level; 75.63% in group B, found to be significant at 5% level;

73.82% in group C found to be significant at 5% level. Improvement in *Mandala* is 59.23% in group A, found to be significant at 5% level; 70.56% in group B, found to be significant at 5% level; 62.67% in group C found to be significant at 5% level. Improvement in *Pidika* is 54.91% in group A, found to be significant at 5% level; 67.33% in group B, found to be significant at 5% level; 62.23% in group C found to be significant at 5% level. Improvement of *sthana* is 52.12% in group A, found to be significant at 5% level; 71.97% in group B, found to be significant at 5% level; 61.06% in group C found to be significant at 5% level. Improvement in *Daha* is 65.32% in group A, found to be significant at 5% level; 74.34% in group B, found to be significant at 5% level; 71.5% in group C found to be significant at 5% level. Improvement in Scales is 56.11% in group A, found to be significant at 5% level; 67.12% in group B, found to be significant at 5% level; 61.12% in group C found to be significant at 5% level. Thus patients in group B showed more symptomatic relief than patients in group A and group C.

Objective evaluation shows that Improvement in Fungal smear test, from become positive (Hyphae, spores present) to Negative (Hyphae, spore absent) is 57.12% in group A, found to be significant at 5% level; 74.16% in group B, found to be significant at 5% level; 65.49% in group C found to be significant at 5% level. There is 39.54% improvement in MDA value in group A, 54.76% in group B, and 44.54% in group C. 34.43% improvement in GSH value in group A, 55.91% in group B, and 42.67% in group C. There is 42.39% improvement in SOD value in group A, 57.11% in group B, and 48.81% in group C. Improvement in above Objective para-

meters is found to be significant using ANOVA test is 5% level of significance.

Aragvadh has *tiktarasa*, *shitaviryā* due to it's *tiktarasakledashoshan&dahanashan* is carried out due this *bhrajak-pitta&kaphadushti* decreases, due to it's *shitaviryāushnaguna* of *bhrajakpitta* decreases all this result in decrease in *kleda*, *atisveda*, *raga*. Due to *Aragvadh'sstransangunakaphapittavishodhan* is carried out which destroys *kapha'skleda&styanaguna&pitta'sushna*, *tikshnaguna* all in tern result in *raktavahastrotasdustinashan* due to this symptoms of *dadru* decreases which gives rise to normal skin. *Aragvadh* (*Cassia fistula linn.*) is Rich source of antioxidants i. e. Total phenolic, Proanthocyanidin and flavonoid contents. Which Interact quickly with free radicals, Scavenge free radicals, Terminate free radical chain reaction, Reduces lipid peroxidation in epidermis, Reduces oxidative stress in skin, Due to this there is no excessive sweating & Less wetness on skin, Prevent fungal growth, Prevent damage of skin from tinea infection and Prevent process of oxidative stress induced tinea infection.

There were no adverse effects found with *Aragvadh phalamajja kashaya*. Only 4 patients complained of loose motions for 3 to 4 times in a day. 2 patients complained about nausea but was not found later.

It suggests that *Aragvadh* is effective antioxidant *dravya* which increases patients immunity and keeps them healthy. Oxidative stress, free radicals are new theories. For sustaining the importance of *Ayurveda*, it is necessary to re-evaluate our concepts & should be proven with modern parameters.

CONCLUSION

At the end of the study it was noted that in group A i.e. patients who were tak-

ing *Aragvadhaphalamajjakashaya* had good symptomatic relief, improvement is enzyme levels i.e. decrease in oxidative stress. In Group C i.e. patient taking Placebo + modern treatment of tinea infection had better symptomatic relief than group A. In Group B i.e. patients taking *Aragvadhaphalamajjakashaya* and modern treatment of tinea infection had excellent symptomatic relief. Group B show better result than group A and group C. Thus can conclude that if *Aragvadh* is given along with modern drugs of tinea infection there are better results in relief in patients for both subjective as well as objective parameters. Thus *Aragvadh* (*Cassia fistula linn.*) is effective in reducing oxidative stress as evident reduced level of MDA (Malondialdehyde), increased level of GSH (Glutathione peroxidase) and SOD (Superoxide dismutase) in patients blood samples. Thus it can be said that *Aragvadh* is potent antioxidant agent without any adverse effects on the body.

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REFERENCES

1. Nicholas A. Boon, Nicki R. Colledge, Brian R. Walker; Davidson's Principles & Practice of Medicine; 20th ed; p 1297
2. Langseth L; 'Oxidants, antioxidants, & disease prevention; 2006; International life science Institute
3. Vd. Yadavji T.; Charak Samhita; 2011; Varanasi; Chaukhamba Surbharati Prakashan; Sutrasthan 4-37
4. Vd. Yadavji T.; Charak Samhita; 2011; Varanasi; Chaukhamba Surbharati Prakashan; Sutrasthan 4-38
5. Prof. K.C. Chuneekar; Bhavaprakasa Nighantu; 2010; Varanasi; Chaukhamba Bharati Academy; p- 66
6. Saikat sen, raja chakraborty; Free radicals, Anti-oxidants, diseases and phytomedicines: Current status and Future; July-august 2010; Regional institute of Pharmaceutical science and technology 411ripura issn 0976-044X IJPSR Volume
7. Amitabye Luximon-Ramma, Theeshan B, Mohammed A, Soobrottee, Okezie I, Aruoma, J Agric; food chem; 2002; 50: 5042-5047
8. Dr. Prakash Paranjpe; Indian Medicinal Plants; 1st ed; Delhi; Chaukhamba Sanskrit Pratisthan; 2001; p- 16
9. The Ayurvedic Pharmacopoeia of India; Part-1; Volume-1; 1st ed; 2001; p- 10
10. Vd. Yadavji T.; Charak Samhita; 2011; Varanasi; Chaukhamba Surbharati Prakashan; Chikitsa sthan 7-94
11. Tripathi B; Sharaṅgadhara Samhita; 2012; Varanasi; Chaukhamba Surbharati Prakashan; p-133
12. Mahajan B.K.; Methods of Biostatistics; 2000; Jaypee Brothers

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