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

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INTRODUCTION

India is a fast developing nation with newer technologies. With globalization there is increased population and pollution, health ignorance, increased hot and humid environment, lowering living status, unhygine. Because of this there is marked increment in skin diseases mainly fungal infection, bacterial infection, allergies. In

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. Kuṣṭhagyna 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, Proanthocya-nidin 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(Puritus), Raga (reddish discoloration), Mandalas (wheels), Pidika (vesicles), sthāna (site), Daha (burning sensation), Scales. Objective improvement was done on the basis of MDA (Malondialdehyde), SOD(Superoxide dismutase), and GSH(Thioglutation 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)
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 cause 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 Śrānasra 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 lpd of R.v.Ayurved Hospital, sion, Mumbai, India. known case of Tinea infection were taken. Study was carried outas per Ethical Clearance NumberAMS/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 16-60 years.
◊ 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 Kaśhaya
Group B : 30 cases - Aragvadh Kaśhaya and Modern treatment of tinea infection
Group C : 30 cases - Modern treatment for 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 (Kaşha)y[10]

**PREPARATION OF ARAGVADHA KASHAYA:-**
Taken 20gm of fresh fruit pulp of Aragvadha (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) Mandal (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 )
2- Limited to two part (To face and arm or to groin and buttocks etc.)
3- On many body part (To groin, face, buttocks, arm, foot grossly involved.)

6. **Daha** ( Burning Sensation )

0- Absent
1- Occasionally

RESULT:

**SYMPTOMATIC RELEIF OBTAINED WITHIN GROUPS :**

Table 1

<table>
<thead>
<tr>
<th>MEDICINE GIVEN</th>
<th>NO OF PATIENTS</th>
<th>SYMPTOMWISE RELEIF (%)</th>
<th>PATIENTWISE RELEIF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aragvadh Kaşhaya</td>
<td>30</td>
<td>57.94</td>
<td>58.24</td>
</tr>
<tr>
<td>Aragvadh Kaşhaya and Modern Rx for TI</td>
<td>30</td>
<td>71.73</td>
<td>72.03</td>
</tr>
<tr>
<td>Placebo and Modern Rx for TI</td>
<td>30</td>
<td>65.11</td>
<td>67.41</td>
</tr>
</tbody>
</table>

**SYMPTOMS**

<table>
<thead>
<tr>
<th>GROUP A (%)</th>
<th>GROUP B (%)</th>
<th>GROUP C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kandu</td>
<td>60.14</td>
<td>70.22</td>
</tr>
<tr>
<td>Raga</td>
<td>60.54</td>
<td>75.63</td>
</tr>
<tr>
<td>Mandala</td>
<td>59.23</td>
<td>70.56</td>
</tr>
<tr>
<td>Pidika</td>
<td>54.91</td>
<td>67.33</td>
</tr>
<tr>
<td>Sthana</td>
<td>52.12</td>
<td>71.97</td>
</tr>
<tr>
<td>Duha</td>
<td>65.32</td>
<td>74.34</td>
</tr>
<tr>
<td>Scales</td>
<td>56.11</td>
<td>67.12</td>
</tr>
</tbody>
</table>

**AVERAGE RESULT IN PERCENTAGE RELEIF WITHIN THE GROUPS**

Table 2

**COMPARATIVE DIFFERENCE IN PERCENTAGE OF RELEIF WITHIN THE GROUPS**

Table 3

<table>
<thead>
<tr>
<th>INVESTIGATIONS</th>
<th>GROUP A (%)</th>
<th>GROUP B (%)</th>
<th>GROUP C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDA</td>
<td>39.54</td>
<td>54.76</td>
<td>44.54</td>
</tr>
<tr>
<td>GSH</td>
<td>34.43</td>
<td>55.91</td>
<td>42.67</td>
</tr>
<tr>
<td>SOD</td>
<td>42.39</td>
<td>57.11</td>
<td>48.81</td>
</tr>
<tr>
<td>FUNGAL SMEAR</td>
<td>57.12</td>
<td>74.16</td>
<td>65.49</td>
</tr>
</tbody>
</table>

**STATISTICAL ANALYSIS OF FUNGAL SMEAR RESULTS EVALUATED USING PAIRED T TEST**

Table 4

<table>
<thead>
<tr>
<th>Fungal Smear</th>
<th>BT</th>
<th>AT</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>t-val</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>24</td>
<td>11</td>
<td>0.43</td>
<td>0.50</td>
<td>0.09</td>
<td>4.66</td>
</tr>
</tbody>
</table>
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 EVALUATION USING ANOVA TEST Table 5

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

** – 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. Age wise 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 Vatakaphaja, 25(27.77%) were Vataapittaja, 31(34.44%) were kaphapittaja. According to agni, 29(32.22%) were vișhamaagni, 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 parameters is found to be significant using ANOVA test is 5% level of significance.

Aragvadh has tiktarasa, shitavirya due to it’s tiktarasakledashoshan&dahanashan is carried out due this bhrajak-pitta&kaphadushti decreases, due to it’s shitaviryaushnaguna 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 raktavahastrotsadshustinashan due to this symptoms of dadru decreases which gives rise to normal skin. Aragvadha(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 Aragvadhaphalamajjakashayaand 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 Aragvadha (Cassia fistula linn.) is effective in reducing oxidative stress as evident reduced level of MDA(Malondialdehyde), increased level of GSH(Thione peroxidase) and SOD(Superoxide dismutase) in patients blood samples. Thus it can be said that Aragvadha is potent antioxidant agent without any adverse effects on the body.

ACKNOWLEDGEMENT

It is great pleasure for me to express my gratitude with profound respect to Shree Dhootpapeshwar Ltd. Mumbai for Standardization & Phytochemical Analysis of Aragvadh kwath samples. I am also grateful to Anchrom Lab. Mulund, Mumbai for HPTLC of Aragvadh kwath sample. I express my thankfulness to Blatter Herbarium, Dept. of Botany in St. Xavier’s College, Mumbai. Last but not least I am very thankful to Sheth R.V. Ayurved Rugnalaya, Sion, Mumbai-22

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