THE EFFECT OF BHASMAS OF MAKSHIKA AND MAKSHIKA SATVA ON THE BLOOD PROFILE OF RABBITS
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ABSTRACT: Bhasmas of makshika and makshika satva were prepared according to Ayurvedic classics. These bhasmas are indicated for the treatment of pandu, kustha and as rasayana. An experimental study was done to see the effect these bhasmas on blood profile of rabbits. On haemoglobin percentage results are encouraging

INTRODUCTION

Rasa Chikitsa is an important branch of Ayurvedic treatment which consists of mainly minerals, metals and poisons drugs processed with highly specialized pharmaceutical techniques. Rasas are very potent rasayana in addition to their therapeutic values. In Rasa granthas, bhasmas of makshika and makshika satva have been used variably to achieve maximum therapeutic benefits, since these are a sort of metals, there are changes of producing toxic and damaging effects on the vital organs like brain, liver, kidney, bone marrow and on different blood profiles. If these are not prepared on said standard of pharmaceutics mentioned in literature of Rasa shastra.

In the present era when the whole world is looking for the best therapy irrespective of the system it belongs to it is high time to revive and update Rasa chikitsa to meet the demand. This therapy was evolved to overcome the short coming of Ayurvedic drug treatment as rasas are superior in qualities, active in lower dosage, free from unpleasant taste and have quick action. The main objective of this paper are to discuss the comparative effect of Bhasmas of makshika and makshika satva on blood profile of rabbits.

Plan of study

In the light of haematinic effect of Bhasmas of makshika satva and Makshika and their uses in pandy (Anaemia) and other related diseases as described in Ayurvedic literature, the present study was planned to explore the above mentioned properties of Bhasmas. The animals were divided randomly into five groups. The first and second group i.e. A and B were treated with Bhasmas of Makshika satva and group C and D with Bhasmas of makshika. Last group of animals (Group –E) was kept as control ad administered biologically inert substances i.e. 20% gum acacia solution in distilled water.

Selection of Dose

The dose of the drug which was given to the animals is 50mg/kg of body weight; this dose is higher than dose of the human being.
because of the vulnerable factor. These bhasmas were missed with 20% gum acacia solution and administered orally by gastric tube.

MATERIALS AND METHOD

[A] Animals: The entire study was conducted on rabbits of the weight of 1.2 to 2.0 kg of both sexes, procured from central animals House of institute of medical sciences, banaras Hindu University, Varanasi. All the animals were kept in colon cages at an ambient temperature of 35°C ±5°C and with a light/dark cycle. The rabbits were fed standard pellets diet and distilled water was given in pots. All animals were acclimatized for one week in animal house of department of Rasa shastra before commencement of experiment.

[B] Drugs: Bhasmas of makshika satva and makshika were suspended in 20% gum acacia solution in distilled water according to the weight of particular animal and administered orally.

[C] Duration of study: All rabbits of 5 groups were treated for 30 days continuously to explore the possible effect of both bhasmas on blood profile (table1)

[D] Collection of Blood samples: For investigation of blood profile blood was taken out from marginal veins of ear of rabbits after interval of one week. Blood (approximately 5 ml) was collected regularly in two sterile vials, one containing sodium citrate (2%) another was plain.

[E] Investigation of Blood samples:

To evaluate the effect of both Bhasmas following test have been performed adopting standard techniques.

1. Haemoglobin percentage
2. Total leucocyte count
3. Differential leucocyte count
4. SGOT & SGPT

[F] The normal values of blood profile of rabbits are given below:-

1 Hemoglobin (gms) – 10.4 -15.6
2 Total leucocyte count -3-12 thousand / mm³
3 Differential leucocyte count
   (a) Polymorph - 12-65
   (b) Eosinophil - 0-2
   (c) Basophil - 3-5
   (d) Lymphocyte -12-65
   (e) Monocyte - 5-20
4. SGOT -10-40
   Karmen Unit

SGPT -10-35
   Karmen Unit

Observation

1. During the whole period of study (30days) all animals shows normal activates including general behaviour.

2. Haemoglobin percentage is increased radually.

3. There was no significant change in TLC (Total leucocyte count) of animals.

4. Differential count varied in its normal range. In rabbits the normal range of polymorph and lymphocyte are more or less similar.

5. The values of SGOT and SGPT varied with in normal parameter.
Table 1: The group, drug and dose of Bhasmas of makshika satva and makshika for experimental work on rabbits

| S. No | Group code | No of Animal | Sex | Averages age (in day) | Average Wt (kg) | Name of Drug given | Dose of Drug for (standard wt. 67kg) | Dose of Drug for animal | Average actual given per animal | Duration (in days) |
|-------|------------|--------------|-----|-----------------------|----------------|-------------------|--------------------------------------|-------------------------|--------------------------------|------------------|
| 1     | A          | 5            | 2   | 3                     | 50             | Bhasma of satva of Makshika | 250 mg | 41 mg/kg | 77.79 mg | 30 |
| 2     | B          | 5            | 3   | 2                     | 40             | -do- | 250 mg | 41 mg/kg | 53.24 mg | 30 |
| 3     | C          | 5            | 4   | 1                     | 50             | Bhasma of Makshika | 250 mg | 41 mg/kg | 68.22 mg | 30 |
| 4     | D          | 5            | 2   | 3                     | 45             | -do- | 250 mg | 20% Soln. | 62.81 mg | 30 |
| 5     | E          | 5            | 3   | 2                     | 45             | Control (gum acacia) | - | 2ml | 30 |

Table 2: Comparative effect of Bhasma of Makshika Satva and Makshika on haemoglobin of rabbits.

| Group | Stats values | Before treatment (gms) / 100 ml | After treatment | After treatment (final results) gms/100ml | Difference (AT/BT) | significance |
|-------|--------------|---------------------------------|----------------|------------------------------------------|--------------------|--------------|
|       |              | 1st Week | 2nd Week | 3rd Week | 4th Week |                                  |                |
| A     | Mean SD Set | 9.36 ± 1.18 | 9.70   | 10.48   | 10.9    | 11.08 ± 0.89                     | 1.72 ± 0.44 ± 0.196 8.77 | P>0.001 Significant |
| B     | Mean SD Set | 9.78 ± 0.75 | 10.06  | 10.82   | 11.10   | 11.2 ± 0.73                      | 1.42 ± 0.377 ± 0.168 8.45 | P>0.01 Significant |
| C     | Mean SD Set | 9.08 ± 1.26 | 9.46   | 9.68    | 10.26   | 10.54 ± 1.35                     | 1.46 ± 0.968 ± 0.433 3.37 | P>0.01 Significant |

p. 3
| Group | Stats. values | Before treatment / mm² | After treatment | After treatment (final results) / mm² | Difference (AT/BT) | significance |
|-------|---------------|------------------------|----------------|--------------------------------------|--------------------|--------------|
|       |               | 1st Week | 2nd Week | 3rd Week | 4th Week |                                  |                |
| A     | Mean SD SET   | 5920 ±228.03 | 5140 | 5200 | 5580 | 5900 | 5900±651.92 | 20.00±589.06 ±263.44<1 P>0.05 Non Significant |
| B     | Mean SD SET   | 5880±516.72 | 5640 | 6700 | 6400 | 6520 | 6520±238.74 | 360±136.38 ±283.91 2.639 P>0.05 Non Significant |
| C     | Mean SD SET   | 6280±476.44 | 5780 | 6640 | 6800 | 6640 | 6640±433.58 | 420±641.87 ±287.06 1.46 P>0.05 Non Significant |
| D     | Mean SD SET   | 6220±216.79 | 5360 | 5700 | 5700 | 5800 | 5800±570.08 | 600±1516.57 ±678.25 <1 P>0.05 Non Significant |
| E     | Mean SD SET   | 5540±554.97 | 5460 | 4800 | 4720 | 4940 | 4940±1148.04 |                |

Table -3 Comparative effect of Bhasma of Makshika Satva and Makshika on total leucocyte of rabbits.
### Table -4 Comparative effect of Bhasma of Makshika satva and Makshika on differential leucocyte Count of rabbits.

| Gr. | Stat-value | Before treatment | After treatment | Differences (AT-BT) | Significance |
|-----|------------|------------------|----------------|--------------------|--------------|
|     |            | P    | E    | B    | L    | M    | P    | E    | B    | L    | M    | P    | E    | B    | L    | M    | P    | L    |
| A   | Mean ± S.D. ±S.E. t | 30 ± 8.57 | 1    | -    | 58 ± 5.44 | -    | 41 ± 5.68 | 1    | -    | 58 ± 5.44 | -    | 11 ± 4.60 | ± 2.06 | 5.34 | ± 4.92 | ± 2.20 | 5.00 | P<0.01 | Significant | P<0.01 | Significant |
| B   | Mean ± S.D. ±S.E. t | 25 ± 11.14 | 1    | -    | 73 ± 12.54 | 43 ± 5.07 | 57 ± 5.70 | 18± 11.19± 5.01 3.59 | ± 693 2.24 | P<0.01 | Significant | P>0.05 | Non Significant |
| C   | Mean ± S.D. ±S.E. t | 37±15.65 | 1    | -    | 62±15.3 | 36±15.14 | 63±15.14 | -1±10.70±4.79 <1 | ± 693 2.24 | P>0.05 | Non Significant | P>0.05 | Non Significant |
| D   | Mean ± S.D. ±S.E. t | 36±12.2 | 1    | -    | 63±12.29 | 45±9.46 | 54±9.52 | 9±17.76±7.94 1.13 | ± 796 1.93 | P>0.05 | Non Significant | P>0.05 | Non Significant |
| E   | Mean ± S.D. ±S.E. t | 30±12.74 | 1    | -    | 70±12.74 | 32±12.31 | 68±12.46 | 2±5.63±2.52 <1 | ± 5.73 ±2.56<1 | P>0.05 | Non Significant | P>0.05 | Non Significant |
Table -5 Comparative effect of Bhasma of Makshika satva and Makshika on SGOT & SGPT of rabbits.

| Gr | Stat. value | Before treatment (KU) | After treatment | Final result | Difference (AT-BT) | Significance |
|----|-------------|-----------------------|-----------------|--------------|-------------------|--------------|
|    |             | SGOT | SGPT | OT | PT | OT | PT | OT | PT | OT | PT | OT | PT | OT | PT | OT | PT | OT | PT | SGOT | SGPT |
| A  | Mean ± S.D. ±S.E. t | 31.2 ± 2.80 | 37± 4.89 | 36.4 | 30.2 | 31.2 | 34 | 28 | 31.6 | 26 | 28 | 26± 4.24 | 28± 4.69 | -5.2 ±5.76 | ±2.58 2.01 | -9.0 ±3.87 | ±1.73 5.20 | P>0.05 | Not-Signi | P<0.01 Signi |
| B  | Mean ± S.D. ±S.E. t | 24 ±4.24 | 28.8± 5.21 | 32.8 | 34.4 | 29.2 | 33.2 | 27.6 | 32.8 | 26 | 31.2 | 26± 3.16 | 31.2 ± 1.09 | 2± 5.65 | ±2.53 <1 | 2.4 ±5.37 | ±2.40 1 | P>0.05 | Not-Signi | P>0.05 Not-Signi |
| C  | Mean ± S.D. ±S.E. t | 29.2± 4.60 | 32 ±6.78 | 33.6 | 32.4 | 31.2 | 34 | 24.8 | 28.8 | 24.8 | 32.4 | 24.8± 5.01 | 32.4 ± 5.36 | -4.4 ±2.61 | ±1.71 3.76 | -0.4 ±8.65 | ±3.86 <1 | P<0.05 | Not-Signi | P>0.05 Not-Signi |
| D  | Mean ± S.D. ±S.E. t | 28.4 ±6.22 | 29.2± 4.14 | 29.6 | 30.4 | 28 | 30.4 | 27.2 | 28 | 25.2 | 28.8 | 25.2 ±4.38 | 28.8 ± 1.78 | -3.2± 5.40 | ±2.41 1.33 | -0.4 ±3.85 | ±1.72 <1 | P>0.05 | Not-Signi | P>0.05 Not-Signi |
| E  | Mean ± S.D. ±S.E. t | 32± 6.78 | 32 ±8.83 | 29.6 | 32 | 27.2 | 32.4 | 28 | 30.4 | 26.8 | 30.4 | 26.8± 4.14 | 30.4 ± 4.14 | -5.2 ±6.57 | ±2.94 1.8 | -1.6 ±9.32 | ±4.17 <1 | P>0.05 | Not-Signi | P>0.05 Not-Signi |
**Table – 6 Comparative effect of Bhasma of Makshika satva and Makshika on weight of rabbits.**

| Group | Stats values               | Before treatment kg | After treatment | After treatment (Final results)Kg | Difference (AT/BT) | Significance          |
|-------|----------------------------|---------------------|-----------------|----------------------------------|--------------------|-----------------------|
|       | Mean ± S.D.                |                     |                 |                                  |                    |                       |
|       | ±S.E. t                    |                     |                 |                                  |                    |                       |
| A     | 1.870 ± 0.120              | 1.975               | 2.195           | 2.220                            | 2.236 ± 0.104      | 0.366 ± 0.046 ± 0.0205 ± 17.85 | P<0.001 Highly significant |
|       |                            |                     | 2.236           |                                  |                    |                       |
| B     | 1.280 ± 0.076              | 1.310               | 1.390           | 1.495                            | 1.530 ± 0.048      | 0.250 ± 0.031 ± 0.014 ± 17.86 | P<0.001 Highly significant |
|       |                            |                     | 1.530           |                                  |                    |                       |
| C     | 1.640 ± 0.096              | 1.690               | 1.765           | 1.862                            | 1.894 ± 0.155      | 0.254 ± 0.098 ± 0.044 ± 5.57 | P<0.001 significant |
|       |                            |                     | 1.894           |                                  |                    |                       |
| D     | 1.540 ± 0.296              | 1.580               | 1.669           | 1.670                            | 1.738 ± 0.0268     | 0.228 ± 0.064 ± 0.028 ± 8.14 | P<0.01 significant |
|       |                            |                     | 1.738           |                                  |                    |                       |
| E     | 1.665 ± 0.317              | 1.660               | 1.674           | 1.670                            | 1.679 ± 0.309      | 0.014 ± 0.028 ± 0.013 ± 1.11 | P>0.05 Non-significant |

**Note:** The table above shows the comparative effect of Bhasma of Makshika satva and Makshika on weight of rabbits. The data includes the mean values ± standard deviation (±S.D.), ±standard error (±S.E.), t-values, and significance levels. The significance levels are indicated as P<0.001, P<0.01, or P>0.05.
DISCUSSION

During the present study we have tried to explore the effect of Bhasmas of Makshika satva and Makshika on blood profile specially on haemoglobin level. By chemical study it was found that the Makshika Bhasma is mainly iron oxide and Bhasma is mainly iron oxide and Bhasma of Makshika satva is copper sulphide in higher proportion. Absorption of iron and copper being given orally takes place in stomach and small intestine. Iron absorbed properly in ferrous from Iron contents of food and drug which are in ferric form may be changed into ferrous form for better absorption in presence of acids.

As we have analysed in chemical study that copper and iron both are ingredient of makshika Bhasma in their oxide form. Both Iron and copper are required for the haemoglobin synthesis. Recent researches reveals that copper has very good role as adjuvant in Iron therapy Haeme synthesis is interfered in copper deficiency. This is the reason why modern pharmacies are adding copper compounds while preparing haematinics.

Iron is transported in blood in combination with a glycoprotein transferin. it binds ferric iron, so the ferrous form of Iron is converted into ferric form for transportation in body. The total plasma content of iron is 30mg/day. It is found that dissociable ferrous salts have high iron content and are better absorbed than ferric salts especially at higher doses. In our study in comparison of 30 mg requirement of per day, we have administered higher doses to the experimental animals in dose of 250 mg/60kg/day. This higher dose have shown distinctive result in respect of haemoglobin leave (Table 2).

However the effective mechanism of Bhasma of Makshika satva could not be analysed. It needs more specialized study. On what account bhasma of Makshika satva has shown excellent result on haemoglobin level it have to be explored.

Total leucocyte count (Table 3), differential leucocyte count (table 4), SGOT (Table 5) and SGPT (Table 5), all these have shown changes with in normal parameter. It gives the way of pioneer statement the Bhasmas of makshika and makshika satva have no toxic or damaging effect on body it they are prepared properly.

In Ayurvedic classics, it is indicated that both these two Bhasma have rasayan effect on body. It was interesting that during course of our experimental study we found remarkable increase in weight of all animals which were subjected to trials of Bhasmas of Makshika satva, where as in animals of control group this increase in weight of animal are not found to such extent (Table 6).

CONCLUSION

On the basis of findings of the blood profile it was concluded that the drug was found effective on haemoglobin level and it never show any abnormal values of total leucocyte count, differential count of WBC, SGOT and SGPT.

In Ayurvedic classics our trial drug is indicated for the treatment of pandu (Anaemia) and Kustha (Skin disorders). This experimental study supported the first indication of Bhasmas of makshika and Makshika Satva.
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