Evaluation of Haematinic Activity of the Siddha Drug Pitha Paandu Maathirai on Phenyl Hydrazine Induced Anaemic Rats

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ABSTRACT
Anaemia continues to be an important public health problem worldwide. Iron deficiency anaemia is the most common nutritional deficiency anaemia. The Anti-anaemic potential of the Siddha medicine Pitha Paandu Maathirai(PPM) on phenyl hydrazine induced anaemic rats was investigated. Anaemia was induced in rats by daily oral administration of phenyl hydrazine (PHZ) at 10 mg/kg for 8 days. Rats that developed anaemia with haemoglobin concentration lower than 13 g/dl were recruited for the study and treated with standard drug Vit B12 syrup (1 ml) and siddha drug Pitha Paandu Maathirai(PPM)(400 mg/kg) for 3 weeks. Haematological parameters such as PCV, MCV,MCH, Hb are monitored. The result states that after administration of test drug, the hematological parameters are significantly increased. This study concludes the siddha drug is effective than the standard drug.

Keywords: Anaemia, Iron deficiency anaemia, Haematinic Activity, Siddha Medicine, Pitha Paandu Maathirai.

INTRODUCTION
Anaemia is the most prevalent nutritional deficiency disorder in the world. WHO defines anaemia is the condition in which the haemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients(1). WHO has estimated that more than 2 billion people worldwide suffering from anaemia with 50% attributed to iron deficiency(2). 44% of adolescent girls are affected by anaemia in the rural areas in Tamilnadu. Among these 2.1% are severe and 6.3% are moderate and 36.5% are mild (3).

Iron deficiency anaemia is common in our country, because most of the people in our country are suffered from under nutrition unknowingly. It occurs when the body does not have enough iron, leading to the decreased production of red blood cells. In women at their reproductive age anaemia occurs due to menorrhagia and in pregnancy it is due to excess need of iron(4). Iron is important for formation of haemoglobin,myoglobin,and other substances, such as the cytochromes,cytochrome oxidase, peroxidase and catalase. The total quantity of iron in the body averages 4 to 5 grams, about 65 percent of which is in the form of haemoglobin(5).A man excretes about 1 mg of iron each day, mainly into the faces. For a woman, the menstrual lost of blood brings the iron loss an value of about 2mg/day(6).

Now a day many medicines are administrated for the management of anaemia. In traditional system of medicines have several herbals using to manage Anaemia principally iron deficiency. In Siddha system numerous herbo-mineral preparations used to treat anaemic disorders. The interventional drug is Pitha Paandu Maathirai(PPM), which was quoted on the text sarabendra vaithya muraiagal(7) used for Paandu (Anaemia). The present study evaluates the haematinic activity of the interventional Siddha preparation “Pitha Paandu Maathirai(PPM)” on phenyl hydrazine induced rats.

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MATERIALS AND METHODS

Materials

Phenyl hydrazine (PHZ) used for induction of Anaemia and the standard drug Haematenic – Vit B₁₂ syrup was purchased from authorized suppliers. Pitha Paandu Maathirai(PPM) was prepared in Government Siddha Medical College, Chennai.

Experimental Animals

The experiment was conducted in Wistar Albino rats of either sex, weighed 150–200g from the animal house of K.K college of pharmacy, gerugambakkam, Chennai. The animals were maintained under standard laboratory condition with food and water ad libitum. The animals were allowed to acclimatize for 2 weeks before being subjected to experimental protocol. The animals were treated in line with the guide and care of laboratory animals as approved by the Institutional Animal Ethical Committee of k.k college of pharmacy, Chennai with reg no. KKCP/2013/006/CPCSE.

PROCEDURE

Induction of Anaemia

The aim of the study is to evaluate the efficacy of Pitha Paandu Maathirai(PPM) in iron deficiency anaemia. So anaemic wistar albino rats are used for study. Phenyl hydrazine an haemotoxicity chemical is used to induce anaemia in rats. Animals were divided into four groups containing six animals in each. Group I served as control and received regular rat food and drinking water ad libitum. Group II, III and IV rats received phenylhydrazine 10 mg/kg for 8 days orally to induce anaemia in rats. Rats that developed anaemia with haemoglobin concentration lower than 13 g/dl were recruited for the study. Tween 20 a vehicle received by group II. Group III received standard haematinic drug vit B12 (10 ml/kg). Group IV received Pitha Paandu Maathirai(PPM) a siddha drug (400 mg/kg) diluted in a vehicle tween 20.

Treatment of the Animals

The rats were randomly divided into four groups (6 rats per group) and treated daily for 4 weeks. Group 2,3 and 4 animals are anaemic induced by phenylhydrazine.

Group I (control) - received only water and food. These animals are not induced by anaemia.

Group II (negative control) - received only vehicle Tween 20 (10 ml/kg)

Group III (positive control) - received only Vit B12 syrup (1 ml/rat) a standard drug.

Group IV - received 400 mg/kg of Pitha Paandu Maathirai(PPM) respectively.

All administrations were by oral intubation. The absolute dose of test drug given to the rat was calculated by the body surface area ratio between human intended dosages against rat. All the groups were treated orally as single dose daily for three weeks.

Haematological Parameters Analysis

All the rats were fasted overnight and 0.5 ml of blood was collected on next day by puncturing Retro orbital sinus using capillary tube. The blood was collected after induction of anaemia with PHZ and during the end of first, second and third weeks of treatments. The red blood cell count (RBC), haemoglobin concentration (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and Packed cell volume (PCV) were determined using Haematological analyzer HA – 22.

Statistical Analysis

All the results were expressed as mean ± SEM of six animals. Analysis of variance was performed by ONE WAY ANOVA followed by Dunnet’s test. Probability values less than 0.01 were considered as significant.

Result

Oral administration of Phenylhydrazine for 8 days induced anaemia in rats. Pitha Paandu Maathirai(PPM) used in the management of anaemia. As a result there is an increase in the haematological parameters within 3 weeks compared to other group of rats.
Phenyl hydrazine caused significant decrease (P ≤ 0.05) in Hb concentration, RBC count and haematocrit value in all rats indicating Anaemia. After the administration of test drug pitha paandu maathirai, the hematological parameters are significantly increased (P ≤ 0.05). The PHZ – induced Anaemia was significantly reversed within one week of treatment with the test drug, reaching maximum by the third week. The effect of Haematinic syrup was comparable to the test drug Pitha Paandu Maathirai(PPM).

DISCUSSION

Iron deficiency anaemia is a common disease affecting women especially in reproductive age. It is characterised by microcystic hypochromic RBC, in which MCV and MCH are reduced. It occurs due to defective haemoglobin synthesis(12). Iron in the body is used primarily for the synthesis of haemoglobin and normal erythropoiesis requires 20-25 mg of iron per day.(6). Due to chronic blood loss, increased iron requirement, malabsorption of iron leads to iron deficiency(13), so administration of iron required to manage the disease without side effect. It can be prevented by increased dietary intake of iron and vit C for absorption. Administration of Phenylhydrazine a haemotoxicity chemical induce anaemia (14). Rats under the haemoglobin level 13 mg/kg are recruited for the study. The haematological parameters such as PCV, MCV, MCH and Hb are monitored for three weeks(15). After three weeks of treatment with Pitha Paandu Maathirai(PPM) the haematological parameters reach the normal levels.

CONCLUSION

In this study the oral administration of Pitha Paandu Maathirai(PPM) significantly increases the haematological parameters from first week of treatment. This study concluded the haematinc activity of Pitha Paandu Maathirai(PPM) was more effective than the standard haematinic drug.

Table 1. Effect of phenylhydrazine (10 mg/kg, o.p daily for 8 days) on some haematological parameters (T=0) (RBC, Hb, PCV, MCH and MCV)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group I (control)</th>
<th>Group II (anaemic)</th>
<th>Group III (standard)</th>
<th>Group IV (test drug)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dl)</td>
<td>17.13±1.49</td>
<td>12.17±1.07</td>
<td>12.68±1.29</td>
<td>13.08±0.79</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>53.0±3.45</td>
<td>40.4±1.11</td>
<td>40.9±0.53</td>
<td>40.47±1.10</td>
</tr>
<tr>
<td>RBC (x10^6/µl)</td>
<td>7.5±0.73</td>
<td>4.3±0.25</td>
<td>4.61±0.37</td>
<td>4.15±0.36</td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>71.7±77.4</td>
<td>93.15±2.49</td>
<td>94.87±3.21</td>
<td>90.35±1.75</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>23.8±12.29</td>
<td>30.77±1.53</td>
<td>30.94±1.26</td>
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Table 2. Haematological parameter of rat after one week treatment

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<td>PCV (%)</td>
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<td>RBC (x10^6/µl)</td>
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<td>MCV (fl)</td>
<td>76.88±0.12</td>
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<td>MCH (pg)</td>
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Picture 1: Haematological parameters after phenyl hydrazine induced for 8 days

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![Haematological parameters after three weeks](image)

**REFERENCES**