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Research Article

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Haematinic activity of Mahamandoora mathirai in phenylhydrazine induced anaemic rats

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Abstract

Anaemia is the most common disorder of the blood and is a global health problem which affects population in both rich and poor countries. Anaemia is the deficiency of RBC count or haemoglobin content of the blood resulting in pallor, shortness of breath and lake of energy. The primary cause of anaemia is iron deficiency. In *Siddha* system anaemia may be correlated with *PaanduNoi*. Prevalence of anaemia in all age groups is higher in India as compared to other developingcountries[1]. It has serious consequences for the health and well-being as well as social and economic impacts of India. Untreated iron deficiency anaemia can be comes ever enough to interfere with daily life. From the above scenario, we are in a dire need of effective medicine to control anaemia. In this connection, a search for affordable, easily available and efficacious haematinicherbo mineral formulation in the modern world is going on, which should be more effective having fewer sideeffects compared to modern synthetic medicines. Knowledge of iron deficiency and its treatment in Siddha System of medicine dates back from time immemorial. In view of the many health benefits of siddha formulation Mahamandoora Mathirai, is having effective haematinic activityinphenylhydrazine induced anaemic rats.

Keywords: Anaemia, RBC count, Mahamandoora Mathirai,

Background

In modern term, anaemia may be defined as a decrease in the total amount of red blood cells or hemoglobin in the blood. The symptoms are pallor, dizziness, shortness of breath, palpitation, easily fatigue and loss of energy.

The symptoms of *Paandu* can be correlated with anaemia. In the literature of *Gunapadam Thathu-jeevam* authored by R.T.Thiyagarajan, there is a preparation called Mahamandooram(pill) which is exclusively indicated for anaemia in which its efficacy has to be scientifically evaluated. Most Anaemia patients can be treated orally by dried ferrous sulphate given as tablet. The adverse effects of these drugs are epigastric pain, heart burn, nausea, vomiting, staining of teeth, metallic taste, constipation is more than diarrhea. However, these may be caused by alteration of Intestinal flora.

Anaemia adversely affects a child's mental & physical development. A unbalanced diet is the primary cause of anaemia. So control of anaemia in young children and adolescent is necessary to improve the quality of life of youngsters. The more scientific approach to all aspects of life even before thousands of years should be appreciated and bring into our day today life.

Ingredients of *Mahamandoora Mathirai*:

Tamil Name	Botanical Name	Family	Parts Used
Chukku	*Zingiber officinale*	Zingiberaceae	Dried Rhizome
Milagu	*Piper nigrum*	Piperaceae	Dried fruit
Thippili	*Piper longum*	Piperaceae	Dried fruit
Kadukkai	*Terminalia chebula*	Combretaceae	Dried fruit
Nellikai	*Phyllanthus emblica*	Euphorbiaceae	Dried fruit
Thandrikai	*Terminalia bellerica*	Combretaceae	Dried fruit
Venchithiramoolam	*Plumbago zeylanica*	Plumbaginaceae	
Manjal	*Curcuma longa*	Zingiberaceae	Rhizome
Vaividangam	*Embeliaribes*	Myrsinaceae	Dried fruit
Karisalai	*Eclipta prostrata*	Asteraceae	Leaf juice.

Tamil Name	English Name	Chemical Name	Parts Used
Mandooram	Iron rust (impure of iron)	Ferraso ferric oxide	Metal

Method of preparation:

Take all the above the ingredients in equal quantities as powder form and then mandooram taken as equal to the above powder and grind them with karisalai extract.

Drug dosage:

Ilanthaikotta iAlavu[350mg]

Shelf life:

One year

Indication of trial medicine:

Paandu,Sobai

Reference:

Gunapadam Thathu-jeevam page no 199-200
The study revealed the presence of active phytochemicals in *Mahamandoora Mathirai* such as Alkaloids, Carbohydrates, Glycosides ,Phytosterols, Flavanoids, Tannin Proteins, Lignins.

Materials and Methods

Animals

Albino rats of either sex weighingabout180-220gwere obtained from animal house of department of pharmacology, K.M.College of pharmacy, Madurai, India. The rats were acclimated to standard laboratory conditions (temperature:25±2ºC) and maintained on 12hlight/dark cycle.

All the rats were provided with standard food and free access to water *ad libitum*. This present study was approved by the Institutional animal ethical committee (IAEC).

Evaluation of Haematinic Activity

Phenylhydrazine (PHZ) induced anaemia model was used to evaluate the haematinic effects of siddha formulation Mahamandoora Mathirai in rats (2,3). Animals were divided into five groups of 6 each. The first group considered as a normal control group and received distilled water. Except normal control group(Group 1), all the other groups were administered phenylhydrazine(10mg/kgb.w) by oral administration daily for seven days to reduce the concentration of haemoglobin. Rats were considered as anaemic model if haemoglobin concentration was less than 12g/dl(4). Anaemic rats were then randomly grouped into four. These cond group was kept as an anaemic control received 2% of CM Conly. The third, fourth groups were administered with test drug siddha formulation Mahamandoora Mathirai at oral doses of 200mgand 400 mg respectively. The fifth group was kept as standard group received Standard haematinic syrup (2ml/kgp.o). All the drugs, distilled water and vehicle were administered upto 2weeks.

Haematological investigation

Blood was collected from the animals from initial phase(pre- treatment), after one week and two weeks(during and post- treatment) by puncture of retro-orbitalvein. To analyse the haematinic potential of siddha formulation Mahamandoora Mathirai with different doses and standard drug ,the haematological parameters were assessed which include Hb concentration, PackedCell Volume(PCV), Total Red Blood Cells (TRBC),MCV (Mean corpuscle volume),MCH (Mean Cell Haemoglobin) and MCHC (mean corpuscular haemoglobin concentration) and compared with normal control and anaemic control(5).

Statistical analysis

Results of the present study were statistically analysed and expressed as mean±SEM by using One-Way ANOVA followed by Newmannkeuls multiple range tests.*P<0.05; **P<0.01 when compared to normal and anaemic control groups

Table 1: Hematological Parameters of Rats after 14 Days Treatment with Mahamandoora Mathirai

Para meters	Group1 (Normal)	Group2(CMC Anaemic Control)	Group3 (200mg of Test drug	Group4 (400mg of Test Drug	Group 5 Std control (Heamatinicsyr
Hb(g/dl)	17.45±1.26**	9.24 ±1.02	19.08± 1.44**	19.28± 1.56**	21.35±1.67**
PCV(%)	49.26±1.25	43.18±1.40	42.42±2.6	43.20±2.4	54.12±1.52*
RBC ($\times 10^6$/ml)	4.30 ±0.35	4.82 ±0.40	4.85 ±0.40	4.88 ±0.34	5.18 ±0.44
MCV(fl)	76.45±2.22**	91.58±2.46	83.64±2.30*	78.28±1.68**	74.46±2.44**
MCH(pg)	26.45±2.63	33.22±2.22	30.36±1.93	30.84±1.82	28.20±2.45
MCHC(g/dl)	33.28±1.24	33.56±1.35	34.42±1.34	33.50±0.65	34.33±2.48

Values are mean±S.E.M.(Dunnet't'test).*P<0.05;**P<0.01VsControl.

Results and Discussion

Phenylhydrazine is used for the induction of haemolytic anaemia and the study of its mechanism in many species including rats(6,7).Phenyl free radical produced via the 2- electron oxidation of phenylhydrazine by oxyhemoglobin. This free radical binds with red cell and hemolyzes it rapidly and converts oxyhemoglobininto methemoglobin. Thus, PHZ-induced haemolytic injury seems to be derived from oxidative alterations to red blood cell proteins rather than to membrane lipids(11). The RBC, Hb,and PCV of rats administered Phenylhydrazine decreased significantly(P <0.01) while the MCV and MCH increased giving rise to macrocytic anaemia (P<0.05).Mahamandoora Mathiraiat oral doses of 200mg and 400mg showed good percentage of improving n haemoglobin level, which was almost equivalent to standard treated group indicating correction of anaemia induced by Phenyl hydrazine after 14 days treatment. Treatment with Mahamandoora Mathiraiat single oral doses of 200mg and 400mg for14day is represented in Table 1. Significant increase in Hb(p<0.01) was observed when compared to positive control and it was comparable to standard drug used in this study. Phenylhydrazine altered the haematological parameters by haemolysis characterized by decrease in haemoglobin concentration, total RBC counts and PCV on day 7.However,the haematological parameters were restored to normal range after treatment with Mahamandoora Mathiraiat single oral doses of 200 mg and 400mg for 14 days. Effective changes were observed after one week of treatment of anaemic rats with Mahamandoora Mathiraiat oral doses of 200mg and 400mg reversed the influence of Phenylhydrazine resulting to a significant (P<0.05) increase in RBC, Hb, and PCV. The Hb, RBC and PCV reached near normal at the second week of the treatment. Rats treated with Phenylhydrazine (10 mg/kg/day for 7 days) resulted in a marked haemolytic anaemia characterized by decreased RBC, Hb and PCV. The main function of the RBC is the transportation of oxygen into the tissues of the body. At such, any pathological or physiological condition that affects the RBC alters its function and this may be detrimental to the body. In this study Phenylhydrazine altered the function of RBC by haemolysis characterized by decreased levels of RBC, Hb and PCV. However, this effect was restored after one week of Mahamandoora Mathiraiat single oral doses of 200mg and 400mg treatment. Also the recovery was progressive such that after 1week of continuous treatment, the Hb concentration and PCV were higher in the treated groups than in the normal control group.

Conclusion

In order to provide effective, safe and cheap drug and to prove the traditional claim for the treatment of anaemic conditions, the Mahamandoora Mathiraiat single oral doses of 200mg and 400mg was evaluated and found significantly increased the Hb, haematocrit and RBC countin anaemic rats indicating the haematinic effect. Haematinic effect was more pronounced in Mahamandoora Mathiraiat oral doses of 200mg and 400mg which showed its dose-dependent activity. The rapid and progressive recovery of anaemic rats responding to treatment of Mahamandoora Mathiraiat oral doses of 200mg and 400mg may be due to increased erythropoiesis. However, the mechanism of action by which Mahamandoora Mathiraiat oral doses of 200mg and 400mg produced its effect on increasing RBC,Hb

and PCV in experimental animals need to be evaluated in a detailed scientific manner and also conducting clinical trials which are required to under stand the siddha preparation molecular mechanism of action. Based on the result in can be concluded that the Mahamandoora Mathiraiat oral doses of 200mg and 400mg is a good drug of choice for the anaemia.

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