ORIGINAL ARTICLE

Investigation of Hematinic Activity of *Pueraria tuberosa* Linn Aqueous Extract

Ashish Sarkar*

Department of Pharmaceutical Chemistry, Institute of Pharmacy Harish Chandra PG College, Varanasi, Uttar Pradesh, India

ABSTRACT

Introduction: *Pueraria tuberosa Linn* belonging to family Fabaceae, it's an herb and distributed throughout south East Asia and predominately in India. Commonly known as White Indian Kudzu, Siali, Patal Kaddu and Dari.

Aim: In ethnomedicinal reports it was found that this herb has excellent medicinal property also used in various traditional system of medicine. Earlier it was reported that it has been used as restorative tonic, antiaging agent, spermatogenic, immune modulator and also recommended for the treatment of cardiovascular diseases. Based on traditional knowledge we have selected *Pueraria tuberosa Linn* our aim was to find out its hematinic property on experimental animals.

Materials: Water extracts harvested and tuberous roots of *Pueraria tuberosa Linn*, Male Wister rats, Phenyl hydrazine.

Result: Findings of the study suggested that aqueous extract of *Pueraria tuberosa Linn* have significant increase of Rbc and Hb level concludes plant have moderate hematinic activity on animal models chosen further study are needed for evaluation of phytochemical responsible for hematinic activity.

Key words: Antianemic, phenyl hydrazine, *Pueraria tuberose*, red blood cell

INTRODUCTION

Pueraria tuberosa, commonly known as Indian Kudzu, is a Fabaceae herb widely distributed throughout India except in very moist and humid regions of India. It is a perennial climber with woody stem having long and wide tuberous roots. These plants have potential pharmacognostic and pharmacological activity in which some activities are established and others are in under process.[1] Its ethnomedicinal uses are already listed tribes of India used as a vegetable. Although due to a lack of availability and knowledge, many of the works are not carried out till now. The aim of our study was to explore its ethnomedicinal property, therefore, we have to choose hematinic activity of *P. tuberosa* because tribal peoples of Madhya Pradesh already used in anemic condition during excessive blood loss based on their knowledge and ethnomedicinal use we have gone through hematinic activity using water extract of *P. tuberosa*.[2] Anemia has attained epidemic proportions worldwide and it impairs normal development in children and constitutes a major public health problem in young children in developing countries with wide social and economic implications. Conventional drugs used in the management of anemia are either unaffordable or unavailable and may still have undesirable side effects[3] while phenyl hydrazine model was used to evaluate its hematinic activity.[4]

***Corresponding author:**
Email: a.sarkar55@gmail.com

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MATERIALS AND METHODS

Plant Collection

The plant was collected in the month of November from Amarkantak Madhya Pradesh, during winter plants grows its optimum, tuberous roots were cleaned with water, and all the soil material was removed carefully. The plant was authenticated by a taxonomist in the Department of Botany Harishchandra Post Graduate College, Varanasi, M. G. Kashi Vidyapeeth University. A voucher specimen of the plant was deposited at the institute herbarium for future reference. Stems were harvested and tuberous roots are washed with water, cuts into small pieces then shade dried in air. When all the moistures are dried off, small pieces of roots are converted into fine powder stored in airtight container for further use.

Preparation of Aqueous Extract

Seven hundred and fifty grams of the powdered plant material were extracted at 80°C in 3.5 l of distilled water for 4 h. At the end of the extraction, the extract was transferred into a clean dry conical flask and filtered through Whatman filter paper into another conical flask. The filtrate was then air dried on 11 days. The air-dried powder was then weighed and stored in an airtight container.[5]

Animals

Around 4-week-old male, Wistar rats are chosen for study in the animal lab of the Institute of Pharmacy Harishchandra PG College. Before the start of the experiment, animals are maintained at 25°C temperature and were fed rodent pellets and water *ad libitum*.[6]

Design of Experiment

Animals are divided into three deferent groups consisting of four animals in each group
Group 1: Controlled group treated with distilled water
Group 2: Standard treated group
Group 3: Extract treated group.

The anemic condition was induced by the administration of intraperitoneal injection of phenylhydrazine on the dose of 5 mg/kg obtained from Sd-Fine Chemical. The repeated dose was administered for 6 days on 7th day; on the 8th-day, blood samples are collected by intraocular puncture of mice in ethylenediaminetetraacetic acid related plastic tubes for the evaluation of hematological parameters. Red blood cells (RBC), white blood cell (WBC), and hemoglobin (HB) levels were determined and mice were marked as anemic compare to the standard value.[7]

The appropriate doses of water plant extracts were made by dissolving 125 mg (to deliver 50 mg/kg body weight), in 10 ml saline solution, respectively. 0.1 ml of the plant extract solution was orally administered to mice. Blood sampling was done by an intraocular puncture for the determination of WBC count, RBC count, and HB level. The body weight of each rat was assessed during the acclimatization period, once before the commencement of dosing, once weekly during the dosing period and on the day of sacrifice.[8] Standard leveled groups are treated with iron sucrose injection in the same manner as extracts are administered.

RESULTS

The changes in the hematological parameters of the rats during the study are presented in Tables 1-3. The RBC, Hb, of rats administered phenylhydrazine decreased significantly while the WBC count increased shows the establishment of anemia. After 1 week, treatment of anemic rats Groups 2 and 3 treated with iron sucrose and *P. tuberosa* decreased the effect of phenylhydrazine treatment resulting in a significant increase in RBC, Hb level. During our experimental period, the level of RBC and Hb levels of controlled groups treated with distilled water also increase in a very slow pattern.[9] Level of Hb reaches normal during 2nd week while RBC reached normal on 3rd week of the experiment, while WBC count falls down rapidly from 1st week of the experiment.[10] That explains the role of extract modified the HB and RBC levels significantly and decrease WBC level predominately.[11]

Table 1: Hematological parameters of rats after 1st weeks

Group	RBC level	WBC level	Hb level
Control group	01.12±0.38	98.35±5.21	06.18±1.66
Standard treated group	07.21±0.38	55.35±5.21	16.14±1.88
Extract treated group	05.88±0.38	62.35±5.21	14.41±1.54

RBC: Red blood cell, Hb: Hemoglobin, WBC: White blood cell

Table 2: Hematological parameters of rats after 2nd weeks

Group	RBC level	WBC level	Hb level
Control group	02.22±0.55	88.35±3.21	07.15±1.46
Standard treated group	08.18±0.55	32.35±3.21	19.27±1.46
Extract treated group	06.28±0.55	41.35±3.21	16.11±1.46

RBC: Red blood cell, Hb: Hemoglobin, WBC: White blood cell

Table 3: Hematological parameters of rats after 3rd week

Group	RBC level	WBC level	Hb level
Control group	3.12±0.32	98.35±5.02	09.18±1.22
Standard treated group	8.18±0.32	22.35±5.02	20.14±1.22
Extract treated group	6.28±0.32	26.35±5.02	17.41±1.22

RBC: Red blood cell, Hb: Hemoglobin, WBC: White blood cell

DISCUSSION

Phenylhydrazine produces radicals which oxidize hydrogen peroxide. Radicals produce oxidative stress, which promotes hemolysis of red blood cells. Administration of phenylhydrazine in rats causes anemia resulting in the decreased level of RBC and Hb same results were obtained with our experiment during the administration of phenylhydrazine. 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, PHZ altered the function of RBC by hemolysis characterized by decreased levels of RBC and Hb. Furthermore, the recovery was progressive such that after 3 weeks of continuous treatment, the Hb concentration and RBC were higher in the extract-treated groups than in the control group. Further study is needed for the establishment of the mechanism responsible for the hematinic activity and whether it is dose dependent or not also there is the scope of isolation of fraction responsible for hematinic activity.

CONCLUSION

The study has confirmed *in vivo* hematinic activity of aqueous extracts of *P. tuberosa* used in the management of anemic disease. However, its exact mechanism must be evaluated for a better understanding of antianemic activity.

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