

Anti-Anemic Activity of Hydro-Alcoholic Extract Seeds of *Foeniculum vulgare* in Phenylhydrazine Induced Anemic Rats

Chandrakanta Kushwah*, Deepanshu Gupta, Ankur Joshi, Sapna Malviya, Anil Kharia

Department of pharmacy

Modern institute of Pharmaceutical Sciences,

Indore, Madhya Pradesh, India

*chandrakushwah0@gmail.com

ABSTRACT

The main objective of this research was to evaluate the anti-anemic activity in hydro-alcoholic extract of seeds of *Foeniculum vulgare* in phenylhydrazine induced anemic rats. Phenylhydrazine (60mg/kg) was given intraperitoneally in rats for two days to induce anemia. The animals were divided into 5 groups of 6 animals each. Group 1 was known as normal control group, Group 2 was known as anemic control group, Group 3 was known as standard reference control group given with Vit. B₁₂, Group 4 was known as test control-I given with 100mg/kg of hydro-alcoholic extract of seeds of *Foeniculum vulgare*, Group 5 was known as test control-II given with 200mg/kg of hydro-alcoholic extract of seeds of *Foeniculum vulgare*. All the test drugs were given for 28 days through oral route once in a day. On 29th day blood was taken out through tail puncture and was subjected to the determination of RBC, Hb and percentage Haematocrit. Both the hydro-alcoholic seeds extract of *Foeniculum vulgare* and Vit. B₁₂ significantly increase the HB, RBC & percentage Haematocrit level which shows that *Foeniculum vulgare* seeds exhibits the anti-anemic activity.

Keywords: Anemia, anti-anemic activity, hydro-alcoholic extract, *Foeniculum vulgare*, Vit. B₁₂

INTRODUCTION

Anemia affects the lives of more than 2 billion people globally, accounting for over 30% of the world's population which is the most common public health problem particularly in developing countries occurring at all stages of the life cycle. Anemia is a condition that develops when blood lacks enough healthy red blood cells or haemoglobin. Iron deficiency is the most common nutritional disorder in which there is a depleted and a restricted supply of iron to various tissues and which becomes apparent. This may result in depletion of Hemoglobin and iron-dependent intra-cellular enzymes participating in many metabolic pathways. Plant and plant products are being utilized as a source of medicine since long. Plant extracts are used as phototherapeutics and are still a large source of natural antioxidants. Particularly, flavonoids and phenolics are considered as potential therapeutic agents. In many developing countries, herbal medicines are assumed as greater importance in health care (Mohan, 2005; <http://www.who.int/topics/anaemia/en/> cited: 25-08-2017; Tortora, 2015).

MATERIALS & METHODS

Table 1- Plant profile

Plant taken	Fennel
Part used	Seeds
Kingdom	Plantae
Order	Apiales
Genus	Foeniculum
Species	F. vulgare
Family	Apiaceae
Origin	Mediterranean region



Fig. I - Seeds of *Foeniculum vulgare*



Fig. II - Plant of *Foeniculum vulgare*

Preparation of extract

The seeds were collected, shade dried and then converted into coarse powder. The powder was then filled in a Soxhlet apparatus for extraction by 70:30 hydro-alcoholic as a solvent. The Hydro-alcoholic extract was concentrated by vacuum distillation to dry. The collected extract was stored in suitable container and used for further pharmacological studies (Khandelwal 2013).

Animals

Wistar strain male albino rats, weighing 100–150 g were selected for the study. The animals were housed individually in polypropylene cages under hygienic and standard environmental conditions ($22 \pm 3^\circ\text{C}$, humidity 30–70%, 12 h light/dark cycle). The animals were allowed to have standard feed and water *ad libitum*. They were acclimated to the environment for one week prior to experimental use. All the animal testing were done under the approval of Institutional Animal Ethical Committee (IAEC) of Modern Institute of Pharmaceutical Sciences, Indore the approval no. is IAEC/MIPS/01/2017/02 (Hussain *et al*, 2017).

Statistical Analysis

Data's were expressed as mean \pm SEM. The data were analysed by using one way analysis of variance (ANOVA) followed by Dunnet's 't' test. P values < 0.05 were considered as significant (Joshi Ankur *et al*, 2017; Joshi Ankur *et al*, 2017, Gupta Deepanshu *et al*, 2018).

Anti-anemic activity

Anemia was induced by intra peritoneal injection of phenyl hydrazine at 60 mg/kg for 2 days, Following the injections, rats were divided into five groups of six rats each.

Group I-Control rats received 0.1% Carboxy methyl cellulose.

Group II-Phenyl hydrazine treated rats (60 mg/kg per day for 2 days).

Group III-Phenyl hydrazine treated rats with Vitamin B₁₂ per day for 28 days.

Group IV-Phenyl hydrazine treated rats with a single dose of seed extract of *Foeniculum vulgare* (100 mg/kg) per day for 28 days.

Group V-Phenyl hydrazine treated rats with a single dose of seed extract of *Foeniculum vulgare* (200 mg/kg) per day for 28 days.

On completion of the experimental period, the blood was collected with EDTA as an anticoagulant. Plasma was separated by centrifugation. Then Plasma was used for the estimation of various biochemical parameters like Haemoglobin, RBC and percentage Haematocrit.

RESULTS

Table 2 - Effect of seed of *Foeniculum vulgare* on haemoglobin, RBC and percentage haematocrit.

S. No	Drug Treatment	RBC ($10^6 \mu\text{L}^{-1}$)	Hb (g dL^{-1})	HCT %
1.	Normal Control (0.1% CMC)	8.91 \pm 0.61	13.52 \pm 0.55	47.88
2.	Anemic Control Phenylhydrazine (60mg/kg)	4.81 \pm 0.14	6.22 \pm 0.23	28.42
3.	Reference control Vit. B ₁₂	8.28 \pm 0.42***	13.15 \pm 0.73***	44.22**
4.	Test Control - I <i>Foeniculum vulgare</i> (100 mg/kg)	8.23 \pm 0.54***	13.21 \pm 0.74***	42.53**
5.	Test Control - II <i>Foeniculum vulgare</i> (200 mg/kg)	8.39 \pm 0.39***	13.33 \pm 0.68***	47.71**

Data were expressed as Mean \pm SEM (n=6)

*P<0.05, ** P<0.01 and *** P<0.001 vs. Anemic Control

The hydro-alcoholic extract of seeds of *Foeniculum vulgare* showed the presence of alkaloids, flavonoid, iron, saponins, carbohydrates, amino acids, glycoside, proteins and fixed oil & fats. Anti-anemic activity of *Foeniculum vulgare* seeds extract on

Phenylhydrazine induced haemolytic anemia in rats was studied and the results were shown on table 2. The anti-anemic activity of *Foeniculum vulgare* seeds extract was assessed by determining the red blood cell count, haemoglobin and haematocrit

percentage. Phenylhydrazine decreased the RBC, Hb and % HCT as compared with normal control. There was significant ($P < 0.001$) increase in RBC and Hb with both Vitamin B₁₂ and *Foeniculum vulgare* seeds extract against phenylhydrazine provocation. Also there was significant ($P < 0.01$) increase in % HCT with both Vitamin B₁₂ and *Foeniculum vulgare* seeds extract. This shows that *Foeniculum vulgare* seeds have anti anemic activity against phenylhydrazine induced haemolytic anemia in rats and it has

comparable effect as that of the standard drug Vitamin B₁₂.

CONCLUSION

It has been concluded that the Hydro-alcoholic seed extract of *Foeniculum vulgare* exhibits anti-anemic activity against phenylhydrazine induced anemia in rats. The anti-anemic effect produced by the *Foeniculum vulgare* seed may be due to its high content of iron which is present in the plant.

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