



ANTI-ANEMIC ACTIVITY OF HYDRO-ALCOHOLIC LEAF EXTRACT OF *BRASSICA OLERACEA* VAR IN PHENYLHYDRAZINE INDUCED ANEMIC RATS

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ABSTRACT

The study deals with the evaluation of anti-anemic activity of oral administration of hydro-alcoholic extract of fruit of *Brassica oleracea* at different dosage levels (250 & 500mg/kg body weight) on female Wistar rats using various paradigms of anemia. India is one of the richest sources of herbal plants and seeds. Many of them were used as traditional and folk medicine and as a natural remedy to cure various health problems in early days. In the present study, the extraction of fruit of *Brassica oleracea* was carried out with Soxhlet apparatus. The phytochemical screening showed the presence of phytoconstituents like triterpenoids, flavonoids, alkaloids, carbohydrate, protein-amino acid, saponins, mucilages and fixed oils in hydro-alcoholic of fruit of *Brassica oleracea* (L). The anti-anemic activity in rats was done by using the chemical phenylhydrazine. Phenylhydrazine was given to the experimental group (24 rats) as oral administration of 100mg /kg daily for a period of eight days to induce anemia and the remaining rats (6 rats) serves as normal control. Phenylhydrazine treated rats with Haemoglobin concentration of <14g/dl were considered as anemic and are included in the study. The hydro-alcoholic extract of fruit of *Brassica oleracea* was given to two experimental groups (IV and V group) at two different dosage levels of (250 mg/kg body weight and 500 mg/kg body weight) for a period of one month. The effect of hydro-alcoholic extract of fruit of *Brassica oleracea* in Wistar rats has shown significant increase in the level of hematological parameters after the period of treatment.

Keywords: Hydro-alcoholic extract, *Brassica oleracea*, Phytochemical screening, Anemia, Anti-anemic activity.

INTRODUCTION

Iron Deficiency Anemia (IDA) presents as an alarming health challenge in developing countries. Physical work capacity is affected in IDA, as decreased hemoglobin reduces the availability of oxygen to the tissues thereby affecting the cardiac output. The cabbage (*Brassica oleraceae* var. *capitata*) is an herbaceous and leafy plant which belongs to the Brassicaceae family. It presents a high versatility, not only due to its nutritive value, being rich in calcium, protein, iron and vitamin C. According to WHO the 30% of global population i.e., more than 2 billion people suffers from anemia, which is a most common health problem among people. As per survey & WHO allopathic medicines used for the treatment of anemia causes side effects like Iron poisoning, nausea, vomiting, diarrhea, constipation, etc. to overcome

these problems herbal treatment is necessary. The objective of this study is to evaluate anti-anemic activity of hydro-alcoholic extract of *Brassica oleracea* var. *capitata* in order to validate ethno botanical uses.^{1, 2, 3}

MATERIALS AND METHODS

Plant profile:

The plant taken was cabbage whose biological name is *Brassica oleraceae* var. *capitata* which belongs to the family of Brassicaceae. The leaf part of the plant was used. The plant was identified & authenticated.

Preparation of extract:

The leaves 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.⁵

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 *adlibitum*. 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.⁶

Anti-anemic activity:

The animals were divided into five groups as Group I, II, III, IV and V. Group I served as normal control received 1ml /kg of 0.5% CMC (Carboxy Methyl Cellulose), Group II served as anemic control received 1ml/kg of 0.5% CMC (Carboxy Methyl cellulose), Group III anemic rats were treated with vitamin B12 syrup (1ml/kg), while Group IV anemic rats received hydro-alcoholic extract of *Brassica oleracea* 250mg / kg body weight and Group V anemic rats received hydro-alcoholic extract of *Brassica oleracea* 500mg /kg body weight respectively daily for a period of one month. All the test drugs were administered orally. On completion of the activity the blood was collected in EDTA coated tube under by tail puncture

under phenobarbitone (45mg/kg, ip) anaesthesia for the estimation of various biochemical parameters like Haemoglobin, RBC and percentage Hematocrit were evaluated.^{2,4}

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RESULT AND DISCUSSION

The effect of hydro-alcoholic extract on Hb, RBC, WBC and serum iron on phenylhydrazine induced anemia in rats were shown in Table (I, II, III & IV) respectively. The hematological parameters were measured up to four weeks. Phenylhydrazine reduces the levels when compared to normal control. The hydro-alcoholic extract at 250mg/kg body weight did not show significant increase in Hb after 1st week of treatment, but it enhances the Hb level significantly ($P<0.05$) after the next 2nd, 3rd and 4th week of treatments. The hydro-alcoholic extract at 500mg/kg significantly ($P<0.01$) elevated the Hb content from the 1st week onwards. The anti-anemic effect of aqueous extract was equipotent as that of standard drug vitamin B12 syrup.^{4,7}

Table 1: Effect of hydro-alcoholic extract of *Brassica oleracea* on hemoglobin in phenyl hydrazine induced anemic rats

Drug Treatment	Hemoglobin-HB g/dl				Standard reference
	1 st Week	2 nd Week	3 rd Week	4 th Week	
Normal control (1ml /kg 0.5% CMC)	18.57±0.31**	19.65±0.21**	19.44±0.23**	19.21±0.29**	
Anemic control (1ml /kg 0.5%CMC)	12.11±0.13	12.43±0.19	12.88±0.23	11.63±0.27	< 14g/dl
Vitamin B ₁₂ syrup (1ml/kg)	13.67±0.31**	15.85±0.45**	17.27±0.42**	19.80±0.46**	
Hydro-alcoholic extract (250mg /kg)	14.08±0.17	14.77±0.24**	14.90±0.17**	15.45±0.39**	
Hydro-alcoholic extract (500mg /kg)	15.21±0.77**	16.66±0.50**	18.70±0.32**	19.26±0.32**	

Data were expressed as Mean ± SEM (n=6)
*P<0.05, ** P<0.01 and *** P<0.001 vs. Anemic Control

Table 2: Effect of hydro-alcoholic extract of *Brassica oleracea* on RBC (Red Blood Cells) in Phenylhydrazine induced anemic rats.

Drug Treatment	RBC (million cells/cubic millimeter)				Standard Reference
	1 st Week	2 nd Week	3 rd Week	4 th Week	
Normal control (1ml /kg 0.5% CMC)	4.55±0.07**	4.99±0.06**	4.97±0.12**	4.77±0.24**	
Anemic control (1ml /kg 0.5%CMC)	2.71±0.07	2.58±0.13	2.45±0.08	2.43±0.08	
Vitamin B ₁₂ syrup (1ml/kg)	3.41±0.05**	4.44±0.23**	5.04±0.21**	5.19±0.18**	4.0-5.5/mm ³
Hydro-alcoholic extract (250mg /kg)	2.69±0.08**	3.59±0.12**	3.39±0.10**	3.87±0.21**	
Hydro-alcoholic extract (500mg / kg)	3.89±0.06**	4.37±0.23**	4.56±0.11**	4.70±0.11**	

Data were expressed as Mean ± SEM (n=6)
*P<0.05, ** P<0.01 and *** P<0.001 vs. Anemic Control

Table 3: Effect of hydro-alcoholic extract of *Brassica oleracea* on WBC in phenyl hydrazine induced anemic rats.

Drug Treatment	WBC (Cells/cubic millimeter)				Standard Reference
	1 st Week	2 nd Week	3 rd Week	4 th Week	
Normal control (1ml /kg 0.5% CMC)	8665.98±23.87	8567.20±42.77*	8664.60±26.89*	8627.06±25.62	4500 to 10000 mcLS
Anemic control (1ml /kg 0.5% CMC)	8638.94±45.29	8945.53±34.87	9163.69±36.35	8927.30±35.36	
Vitamin B ₁₂ syrup (1ml/kg)	8675.74±37.48	8674.86±43.86	8498.22±28.79**	8521.73±39.47*	
Hydro-alcoholic extract (250mg /kg)	8564.29±28.47	8956.99±54.83	9025.92±36.91	8892.29±24.12	
Hydro-alcoholic extract (500mg / kg)	8512.59±39.83	8534.39±27.81	8553.77±21.45	8532.59±27.04	

Data were expressed as Mean ± SEM (n=6)

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

Table 4: Effect of hydro-alcoholic extract of *Brassica oleracea* on serum iron in phenylhydrazine induced anemic rats

Drug Treatment	Serum iron (mg/dl)				Standard Reference
	1 st Week	2 nd Week	3 rd Week	4 th Week	
Normal control (1ml /kg 0.5% CMC)	52.73±2.54**	53.75±2.61**	54.79±2.64**	54.82±2.69**	50-170 mcg/dl
Anemic control (1ml /kg 0.5% CMC)	48.15±1.24	48.32±1.29	48.45±1.27	48.50±1.32	
Vitamin B ₁₂ syrup (1ml/kg)	53.40±3.64**	54.45±3.68**	55.53±3.72**	56.59±3.80**	
Hydro-alcoholic extract (250mg /kg)	53.52±3.75**	54.61±3.84**	56.80±3.95**	57.91±4.24**	
Hydro-alcoholic extract (500mg / kg)	54.23±4.21**	55.32±4.64**	57.45±5.31**	59.49±5.47**	

Data were expressed as Mean ± SEM (n=6)

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

CONCLUSION:

Brassica oleraceae is an ancient herb that has been widely consumed and used in traditional medicine. The seeds of *Brassica oleraceae*, Family Brassicaceae (cruciferae) is taken for the present study. The fruit were selected and they were extracted. Phytochemical tests were done on this and have many phytochemical constituents. The results suggest that the hydro-alcoholic extract of *Brassica oleraceae* possesses significant increase in hematological parameters without any ill effects in experimental models (Wistar rats). The above studies concluded that the hydro-alcoholic extract *Brassica oleraceae* of is very

effective in increasing the hematological levels in experimental animal models and it exhibit anti anemic activity.

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