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HEMATOPOIETIC POTENTIAL OF CARICA PAPAYA LEAVES IN HEALTHY RABBITS

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ABSTRACT

Objective: The study was designed investigate pharmacological effects Carica papaya leaves on the Hemoglobin and Renal function test in healthy rabbits. **Methods:** It is experimental and interventional study conducted at department of Pharmacology and therapeutic in Baqai Medical University, Karachi, from March 2015 to May 2015. In this study Carica papaya leaves extract was administer to 18 healthy adult rabbits at two different doses of 250mg/OD and- 500mg/OD, in order to measure the hematological as well as to renal activities parameter in healthy adult rabbits. The rabbits were divided into three (3) equal groups. Group A (control) contain 6 healthy rabbits and fed-standard diet (fresh hay, fresh vegetables and water), Group B (tested) contain 6 healthy rabbits and fed-leaves 250 mg and Group C contain 6 healthy rabbits and fed-leaves 500 mg. **Analytical Parameters:** Complete blood count/Renal function test estimation was done at 0, 15, 30, 45 days. **Data Analysis:** All collected data will be entered into Statistical package of social sciences (SPSS) version 19.0. **Result:** Statistically increase of Hemoglobin levels 4.9% and 6.9% in tested rabbits as compared to Baseline p-value <0.05. Maximum incremental response was observed on day 15 i.e. 11.6 ± 0.33 & 11.7 ± 0.32 respectively. Additionally MCV, MCH, MCHC & RBCs were showed on Test cumulative mean p-value <0.05 value as compared to Baseline in tested rabbits. Whereas Urea and Creatinine were observed no significantly effects in tested rabbits as compared to control Group A on Cumulative mean. **Conclusion:** From our study, obtained results showing that the papaya plant leaves extract are posses hematopoietic potential, as their use in healthy rabbits significant increase the hemoglobin level and thus it could be use pharmacologically for the treatment of anemia.

Key Words: Papaya, Leaves, Hemoglobin, Renal profile.

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INTRODUCTION

Papaya belong to family Caricaceae. It is grown in various parts of the

world [1]. The whole plant parts, including; fruit, roots, bark, peel, seeds and pulp are known to have medicinal properties [2]. It is regarded as an excellent source of ascorbic acid, a good source of carotene, riboflavin and a fair source of iron, calcium, thiamin, niacin, pantothenic acid, vitamin B-6 and vitamin K [3-6]. Extracts from different parts of Carica papaya plant have shown their positive effects when used as anti-microbial, anti-oxidant, anti-malarial, anti-ulcer, anti-HIV, anti-inflammatory, anti-cancer, anti-hypertensive, anti-fertility, anti-fungal and anti-diabetic [7-15].

The papaya leaves contains alkaloids (carpinine, carpine, pseudocarpine, choline), minerals (calcium, potassium, magnesium, iron, copper, zinc) and, vitamins (thiamine, riboflavin, niacin, ascorbic) [16]. The leaf extract used as a anti-cancer, anti-septic, chronic indigestion, overweight, obesity, arteriosclerosis, nervous pains, high blood and weakening of the heart [17].

Carica papaya leaves is a wide pharmacological properties, but in this study was conducted to determine and investigate the effects on hemoglobin, while hematopoietin is synthesized mainly by Kidney and controls erythropoiesis, or red blood cell production, so we performed renal function test were monitored. The purpose of this study was the assessed the effects papaya leaves on the Hemoglobin and Renal function test in healthy rabbit.

MATERIALS AND METHODS

Materials and Methods: This was an interventional and experimental study conducted at Baqai Medical University, Karachi for a period of 45 days. 18 healthy adult rabbits either sex with mean weight of 2.8 kg were chosen. Rabbits were kept in animal house and maintained under standard condition of well aerated room with fed fresh hay and water.

Sample Preparation

. The leaves of the plant were subjected to surface thoroughly washed with clean water and dried in room temperature for two weeks. The dried leaves were subjected to size reduction to a coarse powder by using electric grinder (Anex) and passed through sieve. The powdered sample was weighed by Electric Balance (snowrex Ej-120) and pack in small plastic envelopes and kept in room temperature. From this stock, fresh preparation was made whenever required. This measured leaves powder was mixed initially 10cc plain tap water and subsequently were syringed into aimed oral cavity directly [18-19].

Analytical Parameters: Complete blood count/Renal function test estimation was done at 0, 15, 30, 45 days. Samples were taken from subjects by mean of sterilized disposable syringe from large visible rabbit ear vein by venipuncture. Collected blood was transferred into test tube, for complete blood count was administered in anticoagulant containing container. Whereas for renal function test estimation was collected blood has allowed to clot and then centrifuged to get plasma for assessment.

Statistical Analysis: All collected data was entered into Statistical package of social sciences (SPSS) version 19.0. Data on continuous variables include hematological parameters and biochemical parameters will be presented as Mean ± S.D. Statistical comparisons was performed by using T-test and ANOVA (analysis of variance) for continuous variables. In all statistical analysis only p-value <0.05 will be considered as significant.

RESULTS

Papaya plant leaves extract administered at two different doses of 250mg once a day, and 500mg once a day through oral route for 45 days and schedule of laboratory assessment zero day or baseline, other 15 day, 30 day & 45 days to healthy rabbits produce significant increase Hemoglobin level i.e. 4.9% and 6.9% during study in tested rabbits as compared to Baseline p-value <0.05 (Table 1. Figure).

The hemoglobin level has showed a -0.9% increase in platelet count on dose of 250 mg compared to control value i.e. 11.2 ± 0.58 units. The extended

The animals were randomly divided into three (3) groups and treated as follows:

Group label	Type	Dose	Frequency
Group-A (Control; n =06)		Hay and water as Standard diet/ no sample test meal	
Group-B (Test; n =06)	Seed –fed	250mg/ standard diet (hay and water)	Once a day
Group-C (Test; n =06)	Seed –fed	500mg/ standard diet (hay and water)	Once a day

TABLE 1:

% Change of Hemoglobin, PCV, MCV, MCH, MCHC & RBCs value of Group B & C from Baseline to end of treatment

	Group B Leaves extract 250 mg (n=6) %	Group C Leaves extract 500 mg (n=6) %
Hematology		
Hb.%	4.9	6.9
PCV	0.6	2.0
MCV	-11.9	-11.6
MCH	-4.3	-6.4
MCHC	5.6	2.1
RBCs	14.0	11.7

TABLE 2:

% Change of Hemoglobin, PCV, MCV, MCH, MCHC & RBCs value of Group B & C from Control

	Group B Leaves extract 250 mg (n=6) %	Group C Leaves extract 500 mg (n=6) %
Hematology		
Hb.%	-0.9	3.6
PCV	1.1	7.3
MCV	-2.5	-3.2
MCH	-3.5	-6.5
MCHC	3.1	1.0
RBCs	12.8	17.0

dose of 500 mg showed 3.6% platelet count when to control value of 11.2 ± 0.58 and -0.9% when compared to 250 mg dose response Table-2. Maximum incremental response was observed on day 15 (mean ± S.D) 11.6 ± 0.33, 11.7 ± 0.32 as compared to Baseline (mean ± S.D) 10.5 ± 0.48, 10.8 ± 0.28 in tested rabbits (Table 3-4).

Additionally MCV, MCH, MCHC & RBCs were showed on Test cumulative mean p-value <0.05 as compared to Baseline in tested rabbits (Table 5-6). Urea and Creatinine were observed no significantly effects in tested rabbits as compared to control Group A on Cumulative mean.

DISCUSSION

Papaya is commonly known for its food and nutritional values throughout the world. The medicinal properties of papaya fruit and other parts of the plant are also well known in traditional system of medicine. Papaya leaves extract induce iron (iron is an essential mineral, with many important roles in the body e.g. helps to make red blood cells and folate (folic acid, known as folate in its natural form. However, some studies have reported that the carica papaya leaves help in iron absorption

TABLE 3:

Hemoglobin, PCV, MCV, MCH, MCHC & RBCs estimation test of Group B (Leaves-fed 250mg).

	Day-0 Mean ± S.D	**Day-15** Mean ± S.D	**Day-30** Mean ± S.D	**Day-45** Mean ± S.D
Hematology				
Hb.%	10.5 ± 0.48	11.6 ± 0.33*	10.5 ± 0.34^{o}	11.1 ± 0.55
PCV	38.8 ± 2.79	38.0 ± 1.41	35.3 ± 3.01	34.8 ± 3.87
MCV	80.2 ± 2.40	71.2 ± 0.75*	70.3 ± 0.82*	70.5 ± 0.55*
MCH	23.3 ± 0.82	22.3 ± 0.52	22.3 ± 0.52	22.3 ± 0.82
MCHC	28.8 ± 1.72	29.5 ± 0.84	30.2 ± 1.17	31.7 ± 0.82* ^{o} $^{?}$
RBCs	4.6 ± 0.25	5.3 ± 0.13*	5.2 ± 0.59*	5.3 ± 0.32*

* Significant as compared to baseline (Day 0) $p<0.05$
^{o} Significant as compared to baseline Day 15
$^{?}$ Significant as compared to baseline Day 30

TABLE 4:

Hemoglobin, PCV, MCV, MCH, MCHC & RBCs estimation test of Group C (Leaves-fed 500mg).

	Day-0 Mean ± S.D	**Day-15** Mean ± S.D	**Day-30** Mean ± S.D	**Day-45** Mean ± S.D
Hematology				
Hb.%	10.8 ± 0.28	11.7 ± 0.32*	11.6 ± 0.17*	11.6 ± 0.42*
PCV	37.5 ± 0.84	39.2 ± 0.75*	38.2 ± 0.75	37.5 ± 2.07
MCV	78.3 ± 0.52	70.2 ± 0.75*	70.7 ± 0.82*	69.8 ± 0.75*
MCH	23.0 ± 0.63	21.7 ± 0.82*	21.5 ± 0.55*	21.7 ± 0.82*
MCHC	29.2 ± 0.41	29.7 ± 0.52	30.0 ± 0.63	29.7 ± 0.82
RBCs	4.9 ± 0.06	5.6 ± 0.24*	5.7 ± 0.23*	5.3 ± 0.28*

* Significant as compared to baseline (Day 0) $p<0.05$
^{o} Significant as compared to baseline Day 15
$^{?}$ Significant as compared to baseline Day 30

from rice meal [20]. The present study showed the increased Hemoglobin level in healthy rabbits. The healthy rabbits when fed with papaya plant leaves powder at the dose of 250 mg once a day and 500 mg once a day, showed incremental response in Hemoglobin level i.e. 4.9% & 6.9%, especially maximum incremental response on day 15 i.e. (mean ± S.D) 11.6 ± 0.33, 11.7 ± 0.32 as compared to Baseline (mean ± S.D) 10.5 ± 0.48, 10.8 ± 0.28 in tested rabbits. On the basis of increase in Hemoglobin level that show direct proportion of incremental response. Therefore one can assessment escalation of the dose may show high hemoglobin concentration. Animal studies in elucidating safety data e.g. renal biochemistry have been conducted on healthy rabbits, using test meal;

TABLE 5:

Comparison of Hemoglobin, PCV, MCV, MCH, MCHC & RBCs estimation test of Group B (Leaves-fed 250mg) from Baseline (Day 0)

	Baseline	**Test Cumulative**	P-value
	Mean ± S.D	Mean ± S.D	
Hematology			
Hb.%	10.5 ± 0.48	11.1 ± 0.62	0.076
PCV	35.8 ± 2.79	36.1 ± 3.11	0.878
MCV	80.2 ± 2.40	70.7 ± 0.77	**0.001**
MCH	23.3 ± 0.82	22.3 ± 0.59	**0.004**
MCHC	28.8 ± 1.72	30.4 ± 1.29	**0.023**
RBCs	4.6 ± 0.25	5.3 ± 0.38	**0.001**

Significant difference ($p<0.05$)

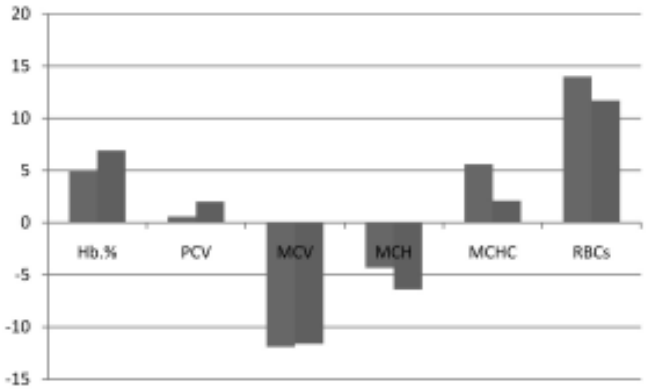
TABLE 6:

Comparison of Hemoglobin, PCV, MCV, MCH, MCHC & RBCs estimation test of Group C (Leaves-fed 500mg) from Baseline (Day 0)

	Baseline	**Test Cumulative**	P-value
	Mean ± S.D	Mean ± S.D	
Hematology			
Hb.%	10.8 ± 0.28	11.6 ± 0.30	**0.001**
PCV	37.5 ± 0.84	38.3 ± 1.45	0.229
MCV	78.3 ± 0.52	70.2 ± 0.81	**0.001**
MCH	23.0 ± 0.63	21.6 ± 0.70	**0.001**
MCHC	29.2 ± 0.41	29.8 ± 0.65	**0.042**
RBCs	4.9 ± 0.06	5.5 ± 0.30	**0.001**

Significant difference ($p<0.05$)

FIGURE
% Change in Hemoglobin, PCV, MCV, MCH, MCHC & RBCs value from baseline to end of treatment in Group B and C



Group B = Leaves-fed (250 mg), Group C = Leaves-fed (500 mg),

desirably no significant increase renal markers were observed. The active constituents of the papaya leaves responsible for the prevent iron deficiency anemia and folate deficiency anemia activity are not known. Again, these studies would require experimental validation. ntal validation.

CONCLUSION

From this study, obtained results showing that the papaya plant leaves possess increased Hemoglobin level in the rabbits. Further studies required to find out and to establish effectiveness and pharmacological rational for the use of these leaves for low hemoglobin count.

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Authors contribution:
** Write the research paper ** Supervise *** Assist in lab working ans statistics**** Take part in animal handiling and draw samples*
Conflict of interest: *The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interests.*
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