

Original Article

THE EFFECT OF AQUEOUS SEED EXTRACT OF TRIGONELLA FOENUM GRAECUM (FENUGREEK) ON HAEMATOLOGICAL PARAMETERS IN ALBINO RATS

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The effect of oral administration of an aqueous extract of the seeds of *Trigonella foenum graecum* in various dose (300-900 mgkg-1 body weight) for 14 days/doses on haematological parameters (HB, RBS, PCV and WBC) in albino rats was studied. There was significant increase in the levels of HB, WBC and PCV after 7 days of extract treatment but the levels decreased when treatment continued to the 14th day. White blood cell counts were significantly higher ($P < .0005$) after 7 of extract treatment as compared to control and the 14 days treatment. The body weights of the animals significantly increased with the number of days of extract treatment and was dose dependent. The weights of the liver, heart and kidney did not change neither with increasing dose nor the period of treatment.

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INTRODUCTION

Trigonella foenum graecum, Linn. (Leguminaceae) or fenugreek, is a herbal medicine used in many parts of the world. Its leaves are used as contraceptive and also for their cooling properties (Chopra *et al.*, 1985), the spermicidal effect (Dhawan *et al.*, 1977), hypocholesterolemic effect (Sharma, 1984) of the seeds have been investigated in albino rats. The hypoglycaemic and antihyperglycaemic effect has been noted in diabetic rats and dogs (Shani *et al.*, 1974; Ribes, *et al.*, 1984; Amin, *et al.*, 1988 and Ajabnoor *et al.*, 1988).

The seeds in various forms are consumed as spice all over the world, Nigeria and Borno State included. The seeds are used to fatten young girls in North Africa in preparation for marriage (Cameron and Carmichael, 1941). In view of the above, it was thought worthwhile to investigate the effect of the aqueous seed extract on haematological parameters in albino rats. This is important in order to assess the values ascribed to the seeds. Since the seeds are consumed as spice, it is important to know the effects the seeds may produce in these animals.

MATERIALS AND METHODS

Animals

Male albino rats of the Wistar strain weighing 120-150g obtained from the National Veterinary Research Institute, Vom, Plateau State, Nigeria were used. They were housed under a standard lighting regimen and had access to standard diet (Nutrifeeds Nigeria Ltd., Kano) and water *ad libitum*.

Preparation of extract

The extraction procedure was carried out according to the methods of Mittal *et al.*, (1981) and Fernando *et al.*, (1989). A 200g portion of dried seeds (purchased from the local market, Maiduguri), was mixed with 1 liter of distilled water in a two liter beaker and boiled for 1½h. It was allowed to cool to 40°C and then strained through these cloth. The liquid part was filtered.

The filtrate was then evaporated until the volume was reduced to 400ml (1ml of the extract represent 0.5g of the powder). The extract was then kept in the refrigerator unit used.

Administration of the extract

The experimental animals were divided into three groups of six rats each. Each group received a specific dose of the extract. Before the extract was administered, the base line measurement of the various parameters (RBC, WBC, HBC and PCV) were taken. Thereafter, the extract in the dosage range of 300-900 mgkg⁻¹ body weight was administered. This was arranged in such a way that, each group of rats received a specific concentration of the extract, over a period of days. In the dose range used there was no mortality or clinical signs of toxicity such as loss of appetite, depression or loss of weight. Blood parameter estimations were carried out on the eighth and fifteenth day of extract administration.

Collection of Blood Samples

Blood samples were collected from the tail of each rat. The tail end of the rat was completely and neatly cut, at a point 2cm from the tip using a sterile surgical blade. The blood collected (Capillary) was used for various estimations.

Blood Analysis

The haematological examinations performed were according to standard methods. Haematocrit was determined by the microhaematocrit method (Dacie and Lewis, 1984). Erythrocytes and total leucocytes were counted using the improved Neubauer haemocytometer. The

packed cell volume of each sample was determined by using a Hawksley microhaematocrit centrifuge at 12,000g for minutes (Dacie and Lewis, 1984). The rats were sacrificed at the end of the experiment. Their internal organs (Liver, Kidney, Spleen and heart) were removed, blotted with filter paper and then weighed.

RESULT

The values for the red cell count after exposure of the rats to various doses (300,600 and 900 mgkg⁻¹) for 7 days and 14 days are presented in Table 1. Increasing the dose (300 to 600 mgkg⁻¹) of the extract increased the RBC count after administration for 7 days compared with control. But there was no significant change when the extract was administered from 14 days as compared with the control.

There was significant (P < 0.5, 005, .015) increase in the WBC count at all dose level (300-900 mgkg⁻¹) when the extract was administered for 7 days (Table 1) and 14 days compared with control. But there was a slight decrease in the number of WBC's obtained after 14 days of extract administration as compared with the 7 days treatment. Increasing the dose of the extract did not seem to have any effect on the WBC count.

Table I.

The effect of aqueous extract of *Trigonella foenum graecum* seeds on red blood cell (Rbc) and White blood cell (Wbc) count in albino rats.

Extract dose mgkg ⁻¹	Red Blood cell (Rbc) count Mm ³ blood x 10 ⁶		White Blood cell (wbc) count mm ³			
	Control (no extract)	Post administration of extract		Control (no extract)	Post administration of extract	
		7 days	14 days		7 days	14 days
300	5.63 ± 0.53	8.70 ± 0.35*	7.21 ± 0.02	9.917 ± 1.599	12.500 ± 2.955**	10.051 ± 4.84*
600	7.77 ± 0.35	9.42 ± 0.32*	8.06 ± 0.46	10.983 ± 2.304	18.995 ± 1.229***	15.383 ± 1.229*
900	7.04 ± 1.07	9.08 ± 0.25**	7.80 ± 0.25	9.53 ± 2.005	15.300 ± 3.007***	16.133 ± 2.618
	P < .005	**P < .05		*P < .05	**P < .0005	***P < 0.15

Significantly different compared to control.

Each value represents the mean SEM from six determinations.

Table 2 shows the values of haemoglobin concentration. Exposure of the rats to the extract for 7 days increased the haemoglobin concentration. This did not seem to be dose dependent. Although the increase occurred at lower concentrations (300 and 600 mgkg⁻¹) There was a decrease in the level of HB, after administration of the extract for 14 days.

There effect of the extract on packed cell volume is shown in Table 2. Rats treated with 300 mgkg⁻¹ body weight of the extract showed significant (P < .0005)

decrease in PCV after 14 days treatment. At 600 and 900 mgkg⁻¹ body weight dose levels, there was significant (P < .20) increase in PCV after 7 days treatment.

The effects of various doses of the extract on body weight of rats and weights of various organs are shown in Table 3. There was gradual increase in body weight of rats in all the groups treated.

The increase was quite significant (P < 0.05) in the groups treated for 14 days, as compared to the control. There was no significant change in the weights of the liver, kidney, spleen and the heart.

Table 2.

The effect of aqueous extract of *Trigonella foenum graecum* seeds on Haemoglobin concentration (Hb) and packed cell volume (PCV) in albino rats

Extract dose mgkg ⁻¹	Haemoglobin concentration (Hb) g/dl			Packed cell volume (PCV) percent		
	Control (no extract)	Post administration of extract		Control (no extract)	Post administration of extract	
		7 days	14 days		7 days	14 days
300	11.60 ± 0.36	12.63 ± 1.27	8.81 ± 0.71	46.67 ± 1.47	47.00 ± 1.41	37.00 ± 0.71**
600	9.56 ± 0.46	12.93 ± 2.78**	8.73 ± 0.49	38.30 ± 2.02	40.67 ± 0.81*	40.67 ± 2.86
900	14.90 ± 0.72	10.87 ± 1.19	10.77 ± 0.26	46.70 ± 4.55	48.00 ± 0.71*	44.33 ± 2.68
	P < .15	***P < .10		*P < .20	***P < .0005	

Significantly different from the control values

Each value represent the mean ± SEM from six determinations

Table 3.

Effect of aqueous extract of *Trigonella foenum foenum graecum* seeds on body and organ weights in albino rats

Parameter	Dose of Extract in mgkg ⁻¹ Administration						
	7 days				14 days		
	Control	300	600	900	300	600	900
Body weight	170 ± 13.5	181.0 ± 15.75*	181.90 ± 18.45*	190.8 ± 6.00**	196.1 ± 13.33***	198.2 ± 12.66***	198.6 ± 10.96***
Liver	4.91 ± 1.10	5.15 ± 1.60	4.20 ± 0.73	4.20 ± 0.63	5.65 ± 0.81	4.90 ± 0.71	4.35 ± 1.01
Kidney	0.91 ± 0.11	1.00 ± 0.36	0.80 ± 0.21	0.95 ± 0.26	1.15 ± 0.22	0.95 ± 0.21	0.75 ± 0.16
Spleen	0.68 ± 0.33	0.76 ± 0.13	0.40 ± 0.39	0.95 ± 0.25	0.60 ± 0.31	0.45 ± 0.32	0.40 ± 0.41
Heart	0.50 ± 0.11	0.50 ± 0.10	0.50 ± 0.10	0.45 ± 0.12	0.60 ± 0.13	0.50 ± 0.09	0.45 ± 0.10
		*P < .25	**P < .20		***P < .05		

Significantly different compared with control

Each value represents the mean ± SEM from eight determinations

DISCUSSION

This study has shown that, in all the parameters studied, there was significant increase in RBC, HB and packed cell volume at the end of the 7th day of extract administration. This may mean that the fenugreek extract may be beneficial for short term use, since the values of the blood parameters decreased after the 7th day of treatment. There was also a significant increase in the WBC count which could be attributed to the possible stimulation of the immune system by the extract. The effect of the fenugreek extract did not seem to be dose dependent. The decrease in the values of the haematological parameters after the 14th day of treatment may have occurred due to lysis of blood cells and/or inhibition of blood cells synthesis of saponins contained in the seeds (Irvin, 1961).

The body weight of both groups (7 and 14 days treatment period) increased significantly. This is in agreement with the report of Cameron and Carmichael, (1941) that rats fed with the dry seeds of

fenugreek grow well. In fact in the North of Africa, young girls are fed with the seeds to produce plumpiness - a valued attribute to beauty before marriage (Scarpa, 1950). The seeds are known to contain such growth factors as leucine (Hardman and Abu-al-futuh, 1976), Isoleucine (Hardman and Abu-al-futuh, 1979), nicotinamide and carbohydrates (Shani, *et al.*, 1974). These are essential growth factors and could contribute to the growth promoting effect of the seeds of *Trigonella foenum graecum*.

The weights of the heart, spleen, liver and kidney did not significantly increase. No marked variation was seen in the weights as compared to control. In spite of this, we suggest that the aqueous seed extract of *Trigonella foenum graecum* may have a positive effect on the growth of laboratory animals. This may add support to the claims by folklore medicine that the seeds produce plumpness when fed to young girls.

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