

Research Article

The Effects of *Jatropha tanjorensis* Aqueous Leaf Extract on Haematological Parameters in Wistar Rats

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ABSTRACT

Immense benefits have been derived by man from using medicinal herbs in treatment and management of disease because they are relatively safer, more affordable and sometimes offer better therapeutic value than synthetic drugs. The leaves of *Jatropha tanjorensis* have been used for the treatment of diabetes mellitus. This study investigated the Haematological indices of aqueous leaf extract of *Jatropha tanjorensis* in male Wistar rats. 25 male Wistar rats weighing 150-180g were used for the research. The rats were divided into five groups of five rats each. Group I served as control, and groups II, III, IV and V were administered 125mg, 250mg, 500mg, and 750mg per kilogram body weight respectively of the *Jatropha tanjorensis* leaf extract daily for 14 days. The rats were maintained under standard laboratory conditions at the animal house in the Faculty of Basic Medical Sciences, Bingham University, Nasarawa State. The rats were sacrificed by cervical dislocation and blood collected by cardiac puncture. 2mls of blood were placed in EDTA bottle for the determination of haematological parameters using Auto Haematology Analyzer. The result shows significant increase in RBC, Hb, PCV, WBC, and PLT in the groups treated with 125mg/kg, 250 mg/kg and 500mg/kg aqueous leaf extract of *Jatropha tanjorensis* when compared with the control ($P < 0.05$). However, at higher dose of 750mg/kg of aqueous leaf extract of *Jatropha tanjorensis*, there was a decrease in RBC, Hb, PCV, WBC, and PLT ($P < 0.05$) when compared with the control. There were no statistically significant changes in MCV, MCH, MCHC, Monocytes, Eosinophils and Basophils in all treated groups compared to the control. Neutrophils was significantly decreased in group treated with 750mg/kg compared with control ($P > 0.05$). The results of this study indicated that at lower doses, the aqueous leaf extract of *Jatropha tanjorensis* leaves may enhance haemopoiesis, but administration of higher dosage may cause haemolysis.

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INTRODUCTION

Some plants, apart from serving as food, have also been known to exhibit medicinal properties (Ozolua *et al.*, 2006). Over 400,000 species of tropical flowering plants have medicinal properties, a factor that may have made traditional medicine cheaper than modern. Medicine (Arun *et al* 2012).

Although plant-based natural medicines are popularly acclaimed to be safe, scientists advocate for proper toxicological studies (Oyewole *et al.*, 2007; Ozolua *et al.*, 2006) in other to ensure safety in the use of natural medicines. Toxicity is the undesirable property of any drug or chemical capable of producing injurious or

detrimental effects on a living organism. Whether or not these injuries occur depend on the amount of chemical absorbed (Cantanzo, 2007). The toxic effect caused by a drug is similar in man and some other animals, a premise for use of animal models in toxicological studies (Cantanzo, 2007).

Jatropha tanjorensis (Euphorbiaceae family) is a perennial herb, a hybrid species which shows intermediacy in phenotypic characters between *Jatropha curcas* and *Jatropha gossypifolia* (Osagie, 2007). The common names include: catholic vegetables, *Jatropha*, "Hospital too far", *Iyana ipaja* (Yoruba) (Omeregie and Osagie, 2011; Oyewole *et al.*, 2012). The leaf is a commonly consumed vegetable in many parts of southern Nigeria like in Edo state. It is also popular as a natural remedy against diabetes in this region (Olayiwola *et al.*, 2004) The plant leaves were initially and popularly consumed in Nigeria as soups and as a

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tonic with the claim that it increases blood volume. The leaves are also employed traditionally in the treatment of anaemia, diabetes and cardiovascular diseases (Orhue et al., 2008; Omoregie and Osagie, 2011; Oyewole et al., 2012).

Jatropha tanjorensis, like many members of the family Euphorbiaceae, contains several toxic compounds, including lectin, saponin, carcinogenic phorbol, and a trypsin inhibitor. Research has shown that fresh *Jatropha tanjorensis* leaves contain a high water and low protein content and trace elements, zinc, iron and selenium (Atansugi et al., 2012). Phytochemical analysis of the leaves showed the presence of flavonoids, tannins, terpenoids, saponins and cardiac glycosides (Oyewole and Akingbala, 2011). They further stated that these phytochemical ingredients have hypolipidemic properties in the blood of rats. The plant's popularity was doused by unproven claims that the whitish latex emanating from the leaf stem and stalk (which causes irritation and mild rashes) may be toxic to man (Omoregie and Sisodia, 2011). *Jatropha tanjorensis* has received a lot of attention due to its potential health benefits, availability and affordability. The aqueous leaf extract of *Jatropha tanjorensis* leaves may enhance haemopoiesis. This study was carried out to determine the effect of aqueous leaf extract of *Jatropha tanjorensis* on Haematological parameters in Wistar rats.

MATERIALS AND METHODS

Plant

The leaves of *Jatropha tanjorensis* were obtained at the National Institute of Pharmaceutical Research and Development (NIPRD), Abuja. The plant was identified and given a voucher number as *J. tanjorensis* by the Staff of Botany Department, Bingham University, Karu. The harvested leaves were air-dried for 2 days then further dried in an oven at 40 °C for 24 hours before grinding. The ground leaves were preserved in moisture-free, airtight laboratory containers for further use. LD50 was determined according to Karber's method, as expressed by Enigide et al., (2013). *Jatropha tanjorensis* showed no overt signs of distress or toxicity even at a dose of 8000mg/kg body weight.

Animals

albino rats (n= 22) of Wistar strain weighing 100-150 grams were obtained from the Institute of Veterinary Research Vom, Plateau State Nigeria, were used for these studies. They were maintained under standard laboratory conditions at the animal care unit in the Faculty of Basic Medical Sciences, Bingham University, Nasarawa State and were fed with standard rat chow and tap water given ad libitum.



Fig 1: *Jatropha tanjorensis* leaves

Methodology

The animals were divided into four groups. Group A consisted of four animals. Groups B, C and D consisted of six animals each. Group A was the control group, Group B, C and D were used as the treatment groups. The group A rats were given their normal feed and water ad libitum. Group B, C and D rats were given 250 mg, 500 mg, and 750 mg per kilogram body weight (mg/kg b. wt.) respectively of the *Jatropha tanjorensis* leaf extract daily for 14 days. The animals in each group were sacrificed at the end of 14 days (Otitoju., et al, 2014). Blood was collected by cardiac puncture into EDTA bottles to be used for the determination of hematological parameters including: Red blood cell (RBC) counts, packed cell volumes (PCV), hemoglobin (Hb) concentrations, white blood cell (WBC) counts, white blood cell differential counts, platelets counts, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC). These parameters were determined using Auto Haematology Analyzer (Systemx Kx 21 Haematology Analyser).

Statistical analysis

All data were presented using a one-way ANOVA followed with a post hoc test (turkey's test) using the SPSS 21 version. Results were presented as means \pm SEM (standard error of mean). $P < 0.05$ significance was used to assess significant difference between controls and treated group.

RESULTS AND DISCUSSION

The results show an increase in the following parameters: red blood cell count ($8.4 \pm 1.4 \times 10^{12/L}$, $7.6 \pm 1.8 \times 10^{12/L}$ and $7.2 \pm 2.3 \times 10^{12/L}$), (Figure 1), Packed cell volume ($48.1 \pm 2.6\%$, $46.3 \pm 1.3\%$ and $45.8 \pm 0.7\%$), (Figure 2), Haemoglobin concentration (16.4 ± 2.4 g/dl, 15.6 ± 0.9 g/dl and 15.0 ± 1.3 g/dl), (Table 1), White blood cell count ($7.8 \pm 1.2 \times 10^9/L$, $8.4 \pm 1.6 \times 10^9/L$ and $6.9 \pm 0.8 \times 10^9/L$), (Figure 3), and Platelet count ($705 \pm 108 \times 10^9/L$, $738 \pm 115 \times 10^9/L$ and $681 \pm 89 \times 10^9/L$).

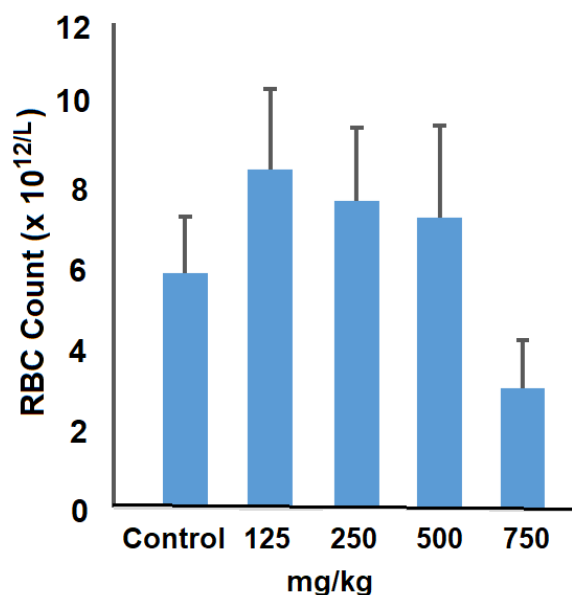


Fig. 1: Effect of aqueous leaf extract of *Jatropha tanjorensis* on Red Blood cell Count

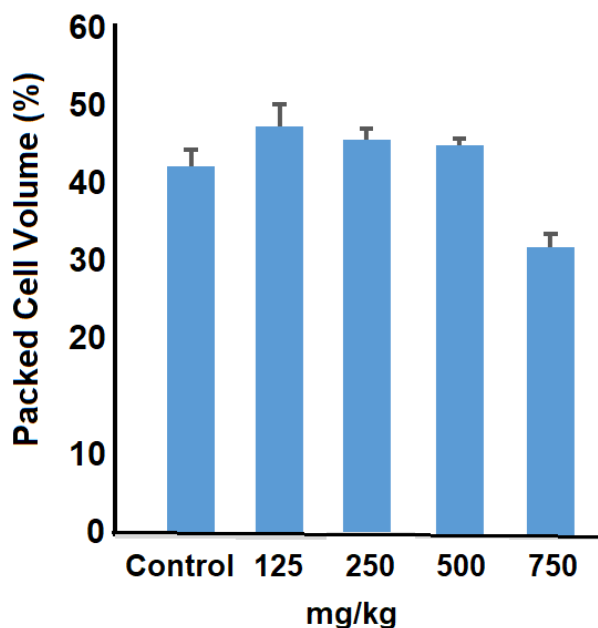


Fig. 2: Effect of aqueous leaf extract of *Jatropha tanjorensis* on packed cell volume

In the groups treated with 125mg/kg, 250 mg/kg and 500 mg/kg aqueous leaf extract of *Jatropha tanjorensis* (Figure 4) respectively, compared with the control, the values are: RBC: $5.8 \pm 1.4 \times 10^{12}/L$, PCV: $43.3 \pm 2.0\%$ Hb: $14.6 \pm 1.5g/dl$, WBC: $6.5 \pm 0.9 \times 10^9/L$ and PLT: $638 \pm 101 \times 10^9/L$). However, at higher dose of 750mg/kg of aqueous leaf extract of *Jatropha tanjorensis*, there was a decrease in RBC ($3.0 \pm 1.2 \times 10^{12}/L$), (Figure 1), PCV ($32.0 \pm 1.5\%$), (Figure 2) Hb; ($12.3 \pm 1.5g/dl$), (table 1), WBC: (4.0 ± 1.2

$\times 10^9/L$), (Figure 3), and PLT: ($403 \pm 76 \times 10^9/L$), (Figure 4), when compared with the control ($P < 0.05$).

There were no statistically significant changes in MCV, MCH, MCHC, (Table 1), Monocytes, Eosinophils and Basophils (Table 2) in all treated groups compared to the control. Neutrophils was significantly decreased in group treated with 750mg/kg compared with control ($P > 0.05$), (Table 2).

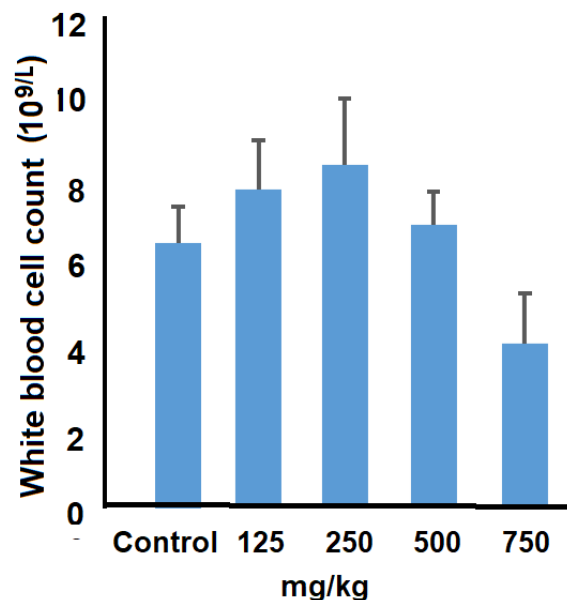


Fig. 3: Effect of aqueous leaf extract of *Jatropha tanjorensis* on White Blood cell count

A study by Ezeonu *et al.* (2017) reported that supplementation with flavonoid-rich fraction of *J. tanjorensis* ameliorated the induced depletion of blood in the test animals. It was previously reported that *J. tanjorensis* is rich in iron (Fe) and this increases the amount of iron available for erythropoiesis (Wardlaw and Kessel, 2002). Studies on the aqueous extract of the leaves of *J. tanjorensis* showed a statistically significant ($p < 0.05$) elevation in the PCV and Hemoglobin concentrations of both male and female wistar rats, thereby justifying the local claim of the plant's use as a blood tonic (Omigie *et al.*, 2013). The flavonoid-rich fraction of *J. tanjorensis* may, therefore, be used in physiological conditions such as pregnancy and menstruation when there is a drop in Hb and PCV. It may also be employed in stress-induced depletion of blood cells as a hematinic (Ezeonu *et al.*, 2017).

The significant increase in white blood cell and the differential leukocytes counts in the treated animals shows that the extracts of *Jatropha tanjorensis*, may increase immunity. Extracts of *Jatropha tanjorensis* can therefore be used in building up the blood level in physiological conditions like pregnancy and during

Table 1: Effect of *Jatropha tanjorensis* intake on heamoglobin indices parameters in male Wistar rats

Variables	Control (n=5)	125 mg/kg (n=5)	250 mg/kg (n=5)	500 mg/kg (n=5)	750 mg/kg (n=5)
Hb (g/dl)	14.6 ± 1.5	16.4 ± 2.4	15.6 ± 0.9	15.0 ± 1.3	12.3 ± 1.2
MCV (fl)	60.4 ± 3.6	61.0 ± 2.8	58.4 ± 2.5	60.1 ± 1.7	61.6 ± 2.0
MCH (pg)	20.4 ± 0.3	20.8 ± 0.6	19.8 ± 1.1	20.4 ± 0.2	20.1 ± 1.0
MCHC g/dL	30.5 ± 1.7	31.4 ± 1.6	32.2 ± 1.0	31.8 ± 0.5	30.8 ± 1.6

Values are Means ± SEM

Table 2: Effect of *Jatropha tanjorensis* intake on differential white cell counts in male Wistar rats

Variables	Control (n=5)	125 mg/kg (n=5)	250 mg/kg (n=5)	500 mg/kg (n=5)	750 mg/kg (n=5)
Neutrophils (%)	18.8 ± 2.1	20.4 ± 0.3	18.3 ± 2.4	16.9 ± 1.3	12.6 ± 2.3
Lymphocyte (%)	74.0 ± 0.3	70.2 ± 0.6	73.1 ± 1.2	80.4 ± 0.5	81.4 ± 0.7
Monocytes (%)	3.6 ± 0.8	5.1 ± 1.8	5.3 ± 1.2	3.8 ± 0.9	2.6 ± 0.4
Eosinophils (%)	2.0 ± 0.4	4.1 ± 0.3	4.7 ± 0.8	2.3 ± 0.4	2.6 ± 0.4
Basophils (%)	0.8 ± 0.2	0.6 ± 0.3	0.8 ± 0.2	0.6 ± 0.1	0.4 ± 0.2

Values are Means ± SEM

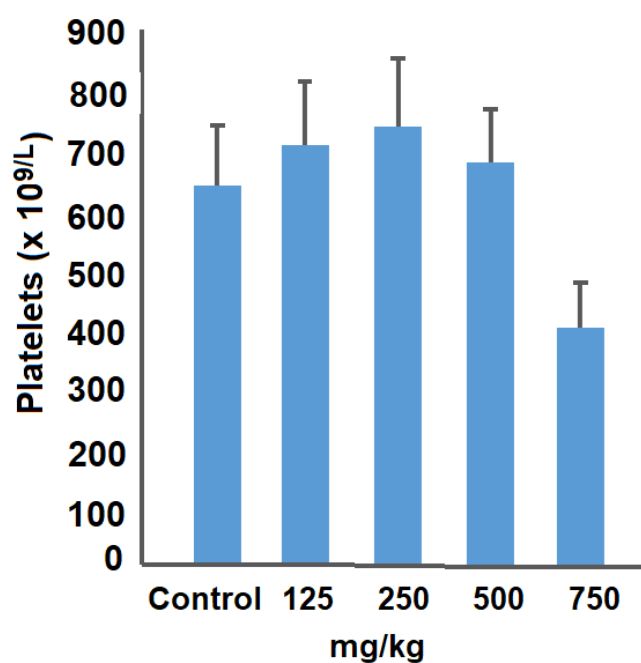


Fig. 4: Effect of aqueous leaf extract of *Jatropha tanjorensis* on Platelets

menstruation when there is decrease haemoglobin concentration and packed cell volume. Although *Jatropha tanjorensis*, because of the presence of flavonoid and iron, zinc, and selenium has demonstrated an increased in Haemopoiesis, we advocate for proper toxicological studies in order to ensure safety in its use. *Jatropha tanjorensis*, like many members of the family Euphorbiaceae, contain several toxic compounds, including lectin, saponin, and trypsin inhibitor, which at increased concentration may cause hemolysis to blood cells.

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