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INVESTIGATING THE EFFECTS OF AQUEOUS EXTRACT OF DOSE DEPENDENT *JATROPHA TANJORENSIS* (CHAYA) LEAF ON HEAMATOLOGICAL PARAMETERS OF MALE WISTER RATS: A DOSE-DEPENDENT ANALYSIS

Dim Catherine Nicholate[1], Ezeokafor Emmanuel Nonso[2], Ajaegbu Obinna Chinedu[3], Enendu Angela Chika[4], Nsofor Cordelia Uche[5], Afuberoh Francis Chukwudi[6] , Anyiam Kennedy Ekenedirichukwu[7], Amasi Mitchell Onyinyechukwu[8]

Department of Human Physiology,Faculty of Basic Medical Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli Campus

Department of Human Physiology, Faculty of Basic Medical Sciences, Nnamdi Azikiwe University, Nnewi Campus

Department of Pharmacology and Therapeautics,Faculty of Basic Clinical Medicine,Nnamdi Azikiwe University

Department of Human Anatomy,Faculty of Basic Medical Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli Campus

Department of Human Physiology,Faculty of Basic Medical Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli Campus

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Abstract: **Medicinal plants are the sources of many scientific drugs of the modern world and thus the leaves of *Jatropha tanjorensis* have been found to have important application both in traditional medicine and as edible vegetable in Nigeria soups. This study aimed to evaluate the effect of aqueous extract of dose- dependent *Jatropha tanjorensis* (chaya) leaf on heamatological parameters of male wistar rats. Total of forty (40) male wister rats weighing 130-150g (about 12 weeks old) were grouped into five groups of 8 rats each, (group A to E), Group A served as negative control (just water and feed only), while Group B (Low dose of Jatropha tanjorensis, 200mg/kg), Group C (Medium dose of *Jatropha tanjorensis* , 400mg/kg), Group D, (High dose of Jatropha tanjorensis, 600mg/kg), Group E (Positive control, just folic acid drugs and feed only). Haematological indices were accessed using automated system (Sysmax Xt-2000i). The results revealed that all the haematological indices, red blood cells, haemoglobin, packed cell volume, white blood cell count MCV, MCH, and MCHC all had increase in values compared with group A and were stastically significantly (P<0.05).**

Keywords: **Heamatological, haemoglobin, Jatropha tanjorensis, Medicinal, Parameters, Sysmax Xt-2000i, Wistar rats.**

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1. INTRODUCTION

Medicinal plants are the sources of many scientific drugs of the modern world. *Jatropha tanjorensis* has been used locally as a source of leafy vegetable and as medicinal plant for a number of years. [4] showed that *Jatropha tanjorensis* is popular as a natural remedy against diabetes in southern Nigeria. There has been growing interest in the investigation of the alternative route for the substitution of synthetic chemicals side effects, which are always in question.

The aim of this study is to determine the effect of aqueous extract of Dose Dependent *Jatropha tanjorensis* leaf on the heamatological parameters (Red blood cells (RBC), Haemoglobin Concentration, Pack cellvolume (PCV) Mean Corpuscular Haemoglobin (MCH) Mean Corpuscular Volume (MCV) Mean Corpuscular Haemoglobin Concentration (MCHC). White Blood Cell (WBC), Differential White blood Cells, Platele Count and Lymphocytes.

2. MATERIALS AND METHODS

Location

This Study was conducted in the Animal House of the Department of Human physiology, Faculty of Basic Medical Sciences, College of Medicine and Health Sciences, Abia State, Uturu.

Materials

Jatropha tanjorensis Leaf and forty (40) male wistar rats, weighing balance, Hand Gloves, Penand Paper**,** Ethylenediamine tetraacetic acid (EDTA) bottles, Feeding Trough**,** Needle and Syringes (2ml, 5ml), Vital feed rat chow (Finisher Mash for Rats, Chikun Feed, Ibadan, Oyo State, Nigeria), tap water and distilled water. Calculator (FX 991ESPLUS; Casio) Paper tape and markers, Chloroform, Centrifuge, Test tube racks, Electric blender (SharkNinja, BL660, China), Gavage and syringe, Spectrophotometer (Shanghai Yoke Instrument Co., Ltd. China), Cotton wool.

Extract Procedure

The leaves were washed thoroughly and aired-dried at room temperature. The dried leaves were ground into powdered form using electric blender. Extraction of leaf was done by cold maceration according to the method described by Hossain et al. (2013) and Evbuomwan et al. (2015). About 500 g of ground leaves were soaked into 4000 mL of ethanol and the solution was macerated for about 24 hrs with gentle shaking at 360 rpm until the soluble matter had properly dissolved. After extraction, the solution was clarified by filtration under vacuum using Whatman filter paper and the ethanol solvent evaporated completely using a rotary evaporator. The solvent free ethanol crude extract was suspended in diethyl ether to purify the extract after which it was exposed to the atmosphere for a while to ensure elimination of the solvent odour. The extracts obtained were then weighed and refrigerated till used

Experimental Design

40 male Wister rats were randomly grouped into five groups of 8rats each as follows;

Group A: Negative control (no extract, just water and feed).

Group B: Low dose of *Jatropha tanjorensis* (200mg/kg)

Group C: Medium dose of *Jatropha tanjorensis* (400mg/kg)

Group D: High dose of *Jatropha tanjorensis* (600mg/kg)

Group E: Positive control (no extract, just folic acid drugs and feed)

All experimental protocols were observed under strict supervision, the experiment lasted for 6-weeks, and administration was done through oral gavage.

Statistical Analysis

The data generated in this study were statistically analyzed using the SPSS version 23 software. Means and standard errors of mean will be calculated. Statistical differences between the experimental and control groups were determined using ANOVA and values will be considered significant at $p \leq 0.05$.

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3. RESULTS

Table I: Effect of aqueous extract of *Jatropha tanjorensis* leaves on white blood cells count

Groups (N=5)	White blood cell (x10^9/l) Mean±SEM
Group A (control)	37.82±1.42
Group B (200 mg/kg of AJTL)	40.22±0.56 [b,*]
Group C (400 mg/kg of AJTL)	44.87±2.01 [b,*]
Group D (600 mg/kg of AJTL)	49.54±1.34 [b,*]
Group E (5 mg/kg of folic acid)	61.68±5.09 [a]
p-value	0.001
F-ratio	13.062

Data was analyzed using ANOVA followed by post Hoc LSD multiple comparison and values were considered significant at $p<0.05$. SEM: Standard error of mean, significant ([a]) and not significant ([b]) when compared to A; *: significant and #: not significant when compared to E, AJTL: aqueous extract of *Jatropha tanjorensis* leaves

Table I result showed increase in-groups B, C, D, and E (p=0.963, p=0.372, p=0.010, p=0.001), in white blood cell when compared to group A but groups B and C had no significant difference, while groups D and E had a significant increase. However, comparison made with group E showed a statistical significant decrease in the WBC levels in groups B, C, and D (p=0.001, p=0.007, p=0.008).

Table II: Effect of aqueous extract of *Jatropha tanjorensis* leaves on red blood cell, hemoglobin, and pack cell volume

Groups (N=5)	Red blood cell (x10^12/l) Mean±SEM	Hemoglobin (g/dl) Mean±SEM	Pack cell volume (%) Mean±SEM
Group A (control)	3.98±0.06	10.20±0.17	30.63±0.58
Group B (200 mg/kg of AJTL)	4.38±0.26 [a,*]	11.00±0.05[b,*]	32.33±0.34 [b,*]
Group C (400 mg/kg of AJTL)	4.97±0.02 [a,*]	11.40±0.30 [b,*]	34.66±0.98 [b,*]
Group D (600 mg/kg of AJTL)	5.22±0.13[a,*]	13.36±0.46[a,*]	40.10±2.05[a,*]
Group E (5 mg/kg of folic acid)	8.80±0.22 [a]	14.20±0.75 [a]	42.63±2.26[a]
P-value	0.000	0.001	0.001
F-ratio	**129.718**	**10.534**	**12.167**

Table II result showed a significant increase in the RBC levels in-group B, C, D, and E (p=0.497, p=0.014, p=0.003, p=0.001), compared to A. In comparison to group E, a statistical significant decrease in the mean RBC levels was indicated in groups B, C, and D (p=0.000, p=0.001, p=0.011). The hemoglobin result showed a significantly higher levels in groups D and E (p=0.010, p=0.002) while group B and C (p=0.282) had a no significant difference, which indicate increase when compared to A. However, comparison made to group E showed a significant decrease levels of hemoglobin in groups B and C (p=0.002, p=0.010) while group D (p=0.282) had no significant difference but indicate a decrease. The packed cell volume result showed a significant increase level in groups D and E (p=0.007, p=0.001) while groups B and C (p=0.432, p=0.081) had a non-significantly increase when compared to A. However, comparison made to group E showed a significant decrease levels of hemoglobin in groups B and C (p=0.001, p=0.003) while group D had no significant difference but demonstrated a lower PCV.

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Table III: Effect of aqueous extract of *Jatropha tanjorensis* leaves on MCV, MCH, and MCHC level

Groups	MCV (fl) Mean±SEM	MCH (pg) Mean±SEM	MCHC (g/dl) Mean±SEM
Group A (control)	56.33±0.88	16.33±1.45	321.70±1.47
Group B (200 mg/kg of AJTL)	69.67±0.02 [a*]	22.67±0.30 [a,*]	332.23±1.76 [a,*]
Group C (400 mg/kg of AJTL)	73.33±0.26 [a,*]	24.67±0.05 [a,*]	332.97±0.88 [a,*]
Group D (600 mg/kg of AJTL)	76.67±0.06 [a,*]	25.66±0.17 [a,*]	343.30±3.71 [a,#]
0Group E (5 mg/kg of folic acid)	83.66±2.03 [a]	34.00±1.15 [a]	342.27±1.27 [a]
p-value	0.000	0.000	0.000
F-ratio	22.751	42.267	62.641

Table III result revealed a significant increase in the mean MCV level in groups B, C, D, and E (p=0.009, p=0.002, p=0.000, p=0.000) when compared to group A. However, comparison to E had a significant decrease in the mean MCV levels in groups B, C, and D (p=0.006, p=0.040, p=0.042). The MCH result showed a significant increase in groups B, C, D, and E (p=0.007, p=0.001, p=0.000, p=0.000) when compared to group A. However, comparison to E had a significant increase in the mean MCV levels in groups B, C, and D (p=0.000, p=0.000, p=0.001). The MCHC result showed a significant increase in the mean MCHC level in groups B, C, D, and E (p=0.001, p=0.008, p=0.010, p=0.000) when compared to group A. However, comparison to group E demonstrated a significant decrease in groups B and C (p=0.001, p=0.011) with group D (p=0.961) indicating no significance.

4. CONCLUSION

The study findings showed that *Jatropha tanjorensis* causes a significant increase in the levels of white blood cells in groups B, C, and D when compared to the control group. However, the mechanism of action following the significant increase in white blood cell count could be responsible for the presence of flavonoids in the extract. Further, the study findings showed agreement with the report of [1]s, which revealed a significant increase in the white blood cells following a dose-pendent extract of the aqueous leaf of *Jatropha tanjorensis* at 125, 250, and 500 mg/kg.

The study findings revealed a significant increase in the levels of RBC, haemoglobin, and packed cell volume following administration of *J. tanjorensis* leaf extract in experimental rats in groups B, C, and D when compared to control. The physiology responsible for the significantly higher levels of RBC, haemoglobin level, and packed cell volume is linked to increased erythropoietin production by the phytonutrients that stimulate the synthesis and release of this hormone).[3] revealed significantly higher levels of RBC, haemoglobin, and PCV following *J. tanjorensis* extract in a diabetic model, which is in accordance with the study findings.

Though, the MCV, MCH, and MCHC levels following administration of the aqueous extract of *Jatropha tanjorensis* leaves demonstrated significantly higher levels compared to the control group. [2] reported significantly higher levels of MCV and MCHC following *Jatropha tanjorensis* administration in phenyl-hydrazine induced anaemia rats, which agrees with the study findings.

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