

The Effect of Ethanol Leaf Extract of *Jatropha curcas* on Some Haematological Parameters of Cyclophosphamide Induced Anaemia in Wister Albino Rats

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Abstract: Before the introduction of drugs that are used for the treatment of various illnesses, man relied heavily on dietary measures, which included the use of traditional medicinal plants. The leaves of *Jatropha curcas* were collected, dried and extracted with ethanol. Twenty five Wister Albino rats weighing 102-200kg were used. Groups 2, 3, 4 and 5 were injected with cyclophosphamide to induce anemia in the rats, while group one served as a negative control without anemia. Group 1 rats without anemia were treated with 0.5ml of normal saline, Group 2 rats with anemia was treated with 100mg/kg body weight of ethanol extract of *Jatropha curcas*, Group 3 rats with anemia was treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas*, Group 4 served as the positive control rats with anemia and was treated with 0.5ml of normal saline. Group 5 which served as the standard control rats with anemia was treated with 5mg/kg body weight of standard drug Chemiron. The feeding lasted for 21 days after which the blood samples were collected from each rats via the ocular region for analysis. The parameters analyzed were packed cell volume (PCV), white blood cell (WBC), red blood cell (RBC) and hemoglobin (HB) concentrations. The result shows that hematological parameters were elevated in groups 3 and 5 rats treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas* and chemiron respectively. This shows that ethanol leaf extract of *Jatropha curcas* at that graded dose of 200mg/kg body weight was able to ameliorate the effect of cyclophosphamide anemia on the hematological parameters of the rats analyzed.

Key words: *Jatropha curcas* · Hematological parameters and anemia

INTRODUCTION

Plants have served as derived function such as food and drugs to man. Scientific exploration into the plant kingdom has therefore assumed various dimensions in modern times particularly in the field of applied sciences, medicines and agriculture [1-6]. Medicinal plants are of great importance to health of individual and communities. There has been claim by herbalist in recent times that certain ailments e.g. ulcer, cancer, malaria, viral and bacterial infections which have defied western medicine due to resistance can be cured with local herbs. These assertions may be true but they lack scientific justification. One of such plant employed in recent time in Nigeria and other African countries is *Jatropha curcas* which have been claim by herbalist to possess medicinal values. *Jatropha curcas* (physic nut) is a species of flowering plant in the spurge family *Euphorbiaceae*. It is a native to the American tropics mostly likely Mexico and

Central America [2]. Anemia is a medical condition characterized by lowered hemoglobin level. There are over 400 types of anemia, with hemolytic anemia being the most frequent [6]. Anemia in other hand is a disorder of blood; therefore the determination of the hematological parameters on anemic rat provides physiological information on proper blood assessments which remain the only sensitive and reliable foundation for ethnical and rational research, diagnosis, treatment and prevention of anemia. Assessment of hematological parameters can not only be used to determine the extent of deleterious effect of extracts on the blood of an animal, but it can also be used to explain blood relating functions of a plant extract or its products [6-12]. Analysis of blood parameters is relevant in risk evaluation as changes in the hematological system have higher predictive value for human toxicity when the data are translated from animal studies. *Jatropha curcas* is a plant belonging to the family of *euphorbiaceae*, it is a shrub that grows 4.5-8m high,

the claims by herbalist that the leaves extract of *Jatropha curcas* possess anti-anemic property appears speculative and has not been documented in the literature. It is found to be growing in many parts of the country, rugged in nature and can survive with minimum inputs and easy to propagate [8]. These prompt the interest of the researcher into verifying these claims. This research is aimed at determining the effects of ethanol leaf extract of *Jatropha curcas* on some hematological parameters on anemic rats.

MATERIALS AND METHOD

Plant Materials: The leaves of *Jatropha curca* were purchased from Oba market in Anambra State and identified by Mr. A. Ozioko of the Department of Plant Science and Biotechnology, University of Nigeria Nsukka. A voucher specimen was deposited in the Department's Herbarium.

Animals: Wistar albino female rats (134 -206g) bred in the Faculty of Veterinary Medicine, University of Nigeria Nsukka, were used in the experiment. The animals were kept under Room temperature and were acclimatized in the new environment for a period of 7 days with free access to food and water before the commencement of the experiment.

Methods

Preparation of Plant Material: The leaves of *Jatropha curcas* were collected, dried and milled to powder using the grinding machine.

Extraction of Plant Material: A known quantity, 500g of ground leaves of *Jatropha curcas* were macerated in 1500ml of ethanol with thorough shaking at regular interval for 72h at room temperature (26-28°C). The resulting solution was filtered using Whatman No. 1 filter paper. The filtrate were concentrated using rotary evaporator to obtain slurry of the extract. The semi-pastry extract were stored in the refrigerator and used for the study.

Experimental Design: Twenty five (25) Wistar albino rats were used in this study. They were randomly distributed into five (5) groups of 4 rats each. Anemia was induced in the rats and this was performed by intraperitoneal injection of cyclophosphomide (10 mg/kg b/w). The rats were fed graded doses of ethanol extract of *Jatropha curcas* through oral intubation method. The groups and doses administered are summarized below.

Group 1: (Negative control rats without cyclophosphomide induced anemia): The rats were treated with [0.5ml of normal saline].

Group 2: (Rats with cyclophosphomide induced anemia): The rats were treated with [100mg/kg b.w. of ethanol extract of *Jatropha curcas*].

Group 3: (Rats with cyclophosphomide induced anemia): The rats were treated with [200mg/kg b.w. of ethanol extract of *Jatropha curcas*].

Group 4: (Positive control rats with cyclophosphomide induced anemia): The rats were treated with [0.5ml of normal saline].

Group 5: (Standard control rats with cyclophosphomide induced anemia): The rats were treated with [5mg/kg body weight of standard drug Chemiron].

Determination of Total Red Blood Cell Count: The determination of total red blood cell count was carried out according to the method of Dacie and Lewis (2000).

Determination of Total White Blood Cell Count: The determination of total white blood cell count was carried out according to the method of Dacie and Lewis (2000).

Determination of Packed Cell Volume (PCV): Packed cell volume (PCV) was determined by the method of Dacie and Lewis (2000).

Determination of Haemoglobin (Hb) Concentration: Haemoglobin (Hb) concentration was determined using haemoglobincyanide (HICN) technique as outlined in the method of Dacie and Lewis (2000).

Statistical Analysis: The data obtained from the laboratory tests were subjected to one-way analysis of variance (ANOVA). Significant differences were obtained at $p=0.05$. The results were expressed as mean and standard deviation (SD). This analysis was estimated using computer software known as Statistical Package for Social Sciences (SPSS), version 18.

RESULTS AND DISCUSSION

Assessment of hematological parameters can be used to determine the extent of deleterious effect on blood constituents of an animal [3]. It can also be used to explain blood relating functions of chemical compounds/ plant extract.

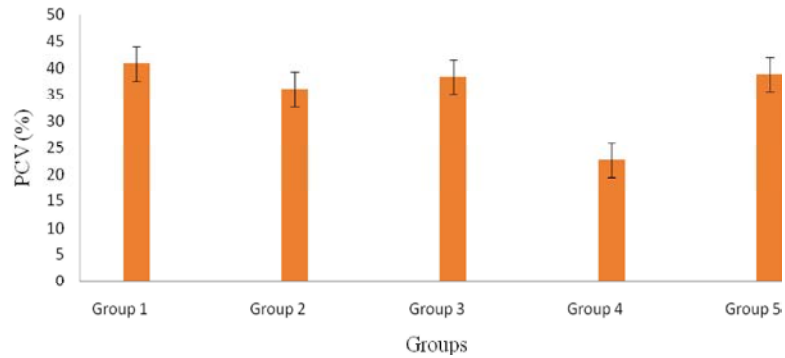


Fig. 1: The Effect of *Jatropha curcas* on packed cell volume (%) level of Cyclophosphamide induced Anemia in rats.

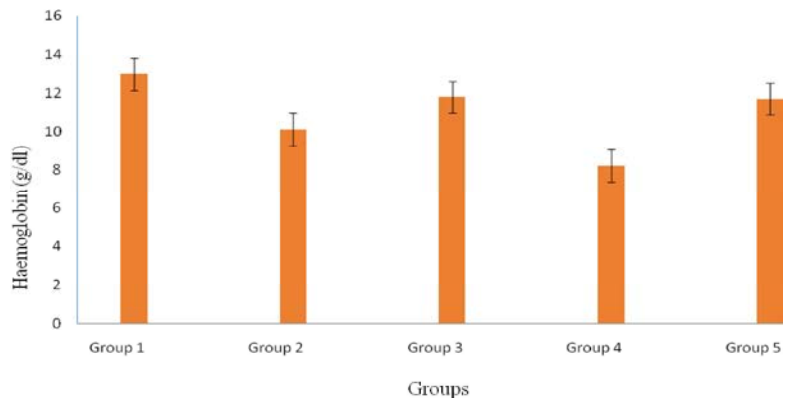


Fig. 2: The Effect of *Jatropha curcas* on hemoglobin (g/dl) level of Cyclophosphamide induced Anemia in rats.

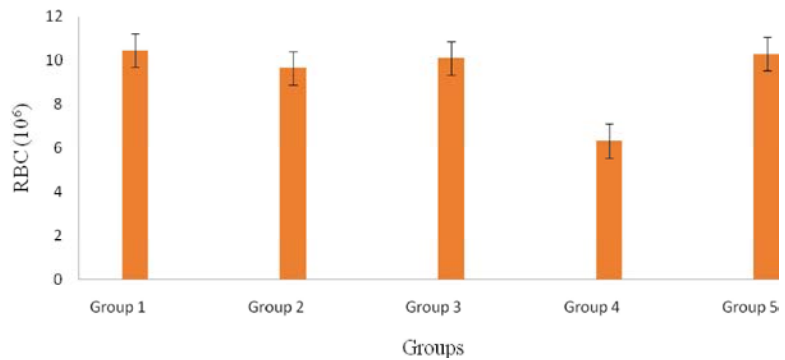


Fig. 3: The Effect of *Jatropha curcas* on red blood cell (10⁶) level of Cyclophosphamide induced Anemia in rats.

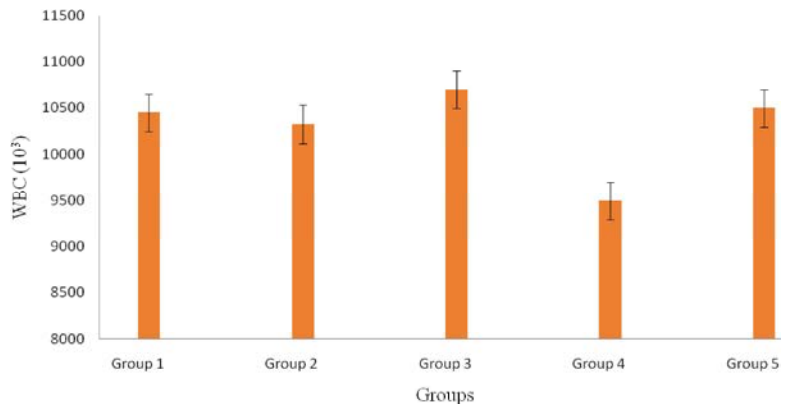


Fig. 4: The Effect of *Jatropha curcas* on white blood cell (10³) level of Cyclophosphamide induced Anemia in rats.

In Figure 1 group 4 (positive control) rats treated with 0.5ml of normal saline significantly ($p < 0.05$) decreased in PCV percentage concentration when compared with group 1 (negative control) and group 5 (standard control) rats. This is an indication of anemia as a result of cyclophosphamide induction. There was no significant difference ($p > 0.05$) when group 3 rats treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas* was compared to groups 1 and 2 rats indicating an ameliorative effect of ethanol extract of *Jatropha curcas* at 200mg/kg body weight of the rats. This agrees with the work of (Aladodo, 2013) [3] that treated diabetic rats with *Jatropha curcas* and noticed the same elevation.

Figure 2 shows that group 4 (positive control) rats treated with 0.5ml of normal saline significantly ($p < 0.05$) decreased in HB grams per dl concentration when compared with group 1 (negative control) and group 5 (standard control) rats. There was no significant difference ($p > 0.05$) when group 3 rats treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas* was compared to group 1 and 2 rats. This also showed an ameliorative effect of the extract on HB concentration of the rats. This elevation in HB concentration of rats also collaborated with the work of (Aladodo, 2013) [3].

Figure 4 shows that group 4 (positive control) rats treated with 0.5ml of normal saline significantly ($p < 0.05$) decreased in RBC concentration when compared with group 1 (negative control) and group 5 (standard control) rats indicating anaemia due to cyclophosphamide induction. There was no significant difference ($p > 0.05$) when group 3 rats treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas* was compared to groups 1 and 2 rats. This also agreed with the work of (Aladodo, 2013) [3].

Figure 4 shows that group 4 (positive control) rats treated with 0.5ml of normal saline significantly ($p < 0.05$) decreased in WBC concentration count when compared with group 1 (negative control) and group 5 (standard control) rats. There was no significant difference ($p > 0.05$) when group 3 rats treated with 200mg/kg body weight of ethanol extract of *Jatropha curcas* was compared to group 1 and 2 rats.

CONCLUSION

The elevation of hematological parameters showed that ethanol extract of *Jatropha curcas* could be used in the treatment of anemia and this has substantiated its usage in traditional medicine in treating anemia and other diseases in Nigeria.

REFERENCES

1. Abolaji, O.A., A.H. Adebayo and O.S. Odesanmi, 2007. Nutritional Qualities of Three Medicinal Plant Parts (*Xylopiiaethiopica*, *Blighiasapida* and *Parinaripolyandra*) commonly used by Pregnant Women in the Western Part of Nigeria. Pakistan Journal of Nutrition, 6: 665-668.
2. Agbogidi, O.M., S.O. Akparobi and P.G. Eruotor, 2013. Health and environmental benefits of *Jatropha curcas* Linn. Unique Research Journal of Agricultural Sciences, 1(5): 76-79.
3. Aladodo, R.A., N.O. Muhammad and E.A. Balogun, 2013. Effects of aqueous root extract of *Jatropha curcas* on hyperglycaemic and hematological indices in Alloxan-induced diabetic rats. Fountain Journal of Natural and Applied Sciences, 2(1): 52-58.
4. Dacie, J.V. and S.M. Lewis, 2000. Practical hematology. 4th Edition.
5. Lorke, D., 1994. A New Approach to Practical Acute Toxicity Testing. Archives of Toxicology, 55: 275-287.
6. MacDonald, I., I. Goddidit and E. Joseph, 2014. Anti-anaemic activity of *Jatropha tanjorensis* Ellis and Saroja in Rabbits. Journal of Medicinal Plants Studies, 2(1): 64-72.
7. Mauseth and D. James, 2003. Botany: An introduction to plant biology. Jones and Bartlett publishers, pp: 271-272.
8. Nahar, K. and M. Ozores-Hampton, 2011. *Jatropha*: An alternative substitute to fossil fuel (IFAS publication).
9. Ojo, A.O. and B.A. Ojo, 2014. Effects of *Alstonia boonei* extract on Hematological Indices of Male Wister Rat. Pharmacological online, 3: 136-140.
10. Olson, H., G. Betton, D. Robinson, K. Thomas, A. Monro, G. Kolaja, P. Lilly, J. Sanders, G. Sipes, W. Bracken, M. Dorato, K.V. Deun, P. Smith, B. Berger and A. Heller, 2000. Concordance of toxicity of pharmaceuticals in humans and in animals. Regul. Toxicol. Pharmacol., 32: 56-67.
11. Taylor, J.L.S., T. Rabe, L.J. McGaw, A.K. Jäger and J. van Staden, 2001. Towards the scientific validation of traditional medicinal plants. Plant Growth Regulation, 34: 23-37.
12. Yakubu, M.T., M.A. Akanji and A.T. Oladiji, 2007. Haematological evaluation in male albino rats following chronic administration of aqueous extract of *Fadogia agrestis* stem. Pharmacog. Mag., 3: 34.