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Original Article

# Haemopoietic activity and effect of Crude Fruit Extract of Phoenix dactylifera on Peripheral Blood Parameters.

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ABSTRACT

Aim: *Phoenix dactylifera* (date palm), has been reported to posses a variety of pharmacological activities which indicate its usefulness in various kinds of diseases and disorders. The present study was aimed at investigating the haemopoietic activity of crude fruit extract of *Phoenix dactylifera (P. dactylifera)* and its effect on peripheral blood parameters. Method: Fifty (50) Wistar rats weighing 100 to 200 grams and aged 2 to 3 months obtained from the Animal House of College of Medicine, University of Nigeria Enugu Campus were acclimatized for two weeks. They were divided into 10 groups of 5 rats per group labeled A1 ,A2, B1, B2, C1, C2, D1, D2, E1 and E2. The first 5 groups were orally administered with graded doses of the crude Aqueous Extract of P. Dactylifera (AEPD) (A1=0.4, B1=0.1, C1=0.52, D1=0.90 mg/kg body weight and E1 [control]= 0.24ml Dimethylsulphoxide (DMSO) while the second 5 groups were orally administered with graded doses of the crude Methanolic Extract of P. Dactylifera (MEPD) (A2=0.4, B2=0.1, C2=0.52, D2=0.90 mg/kg body weight and E2[control]=0.24ml DMSO). The administrations were once daily for 112 days. On Day 113, 2.5ml of blood samples were collected from each rat through the retro bulbar plexus of the median canthus of the eye into tri-potassium- Ethylenediamine tetracetic acid (K3-EDTA) anticoagulant container and bone marrow was also collected for the analysis using stantard operative procedure. Results: The results revealed dosage dependent significant increase in Absolute values, Red Blood Cell (RBC), Haemoglobin (Hb), Packed Cell Volume (PCV), Reticulocytes and Platelet count in both aqueous and methanolic extract when compared with the controls ($p<0.05$, $p<0.001$). The total and differential white blood cell counts and bone marrow examination did not differ significantly when compared with the controls ($p>0.05$). Conclusion: The observed changes in this study has demonstrated that P. Dactylifera has haemopoietic effect when orally administered in Wistar rats.



## 1. Introduction

The use of plant extracts for the treatment of ailments is on the increase especially with the recognition and incorporation of traditional medicine and food into the healthcare delivery system in Negeria.[1] In Nigeria, traditional food and healing system play an important role in healthcare delivery and about 70-80% of the population depends on traditional herbs for most of their ailment.[1] World Health Organization reported that expanding use of traditional and herbal medicine is gaining recognition globally.

*Phoenix dactylifera (P. Dactylifera)* fruit is a delicious desert fruit with much needed vitamins, minerals and energy to help one stay fit and healthy. It belongs to the family Arecacean of the genus Phoenix dactylifera. The phytochemical constituents of P. Dactylifera include alkaloids, flavonoids, steroids, tannins, estertepens, carbohydrates, vitamins and phenolic acids.[2,3] Phoenix dactylifera also posses numerous medicinal properties and is used in the treatment of anaemia, stroke, building up body weight, help in slowing ageing and in treatment of tooth ache.

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Despite the numerous health benefits of P. dactylifera, there is little or no informations towards its haemopoietic activity and effects on peripheral blood parameters. This present study was designed to investigate the haemopoietic activities of crude fruit extract of P. Dactylifera and its effect on peripheral blood parameters. The variables to be measured include haemoglobin, haematocrit, red blood cell count, total and differential white blood cell count, platelet count, reticulocyte count, and bone marrow examinations.

## 2. Materials and Method

### 2.1.Collection of plant materials

The fruits of P.dactylifera were obtained form the Northern Nigeria and authenticated by a Taxonomist in the Department of Botany, niversity of Nigeria Nsukka and a voucher specimen was kept in the herbarium for future reference.

### 2.2.Animal housing

Fifty (SO) Wistar rats were purchased and housed in the Animal House of the College of Medicine, University of Nigeria Enugu Campus, where they were allowed to acclimatize for two weeks. They were fed with commercially available rat feed and allowed access to the feed and water *ad libitum.*

### 2.3.Preparation of the plant extract:

#### *2.3.1.Methanolic extract:*

One hundred (100) grams of the fresh blended fruit of P. dactylifera were extracted exhaustively with 2.5 liters of methanol and the mixture sieved. The remaining methanol in the extract was evaporated to get the concentrated crude extract which was reconstituted with 3% Dimethylsulphoxide (DMSO) and stored in the refrigerator until needed.

2.3.2.Aqueous extract: One hundred (100) grams of the fresh blended fruit of P. dactylifera were extracted exhaustively with 200ml of water and the mixture sieved. The remaining water in the extract was evaporated to get the concentrated crude extract which was reconstituted with 3% Dimethylsulphoxide (DMSO) and stored in the refrigerator until needed.

### 2.4 Experimental Design

Fifty (SO) Wistar rats weighing 100 to 200g and aged 2 to 3 months obtained from the Animal House of College of Medicine, University of Nigeria Enugu Campus were acclimatized for two weeks. They were divided into ten groups of five rats per group labeled Al ,A2, Bl, B2, cr. C2, Dl, D2, El and E2. The first five groups were orally administered with graded doses of the crude aqueous extract of P. dactylifera (AEPD) (Al=0.4, Bl=O.l, C1=0.S2, Dl=0.90mg/kg body weight and E1 [control]= 0.24ml DMSO) while the second five groups were orally administered with graded doses of the crude Methanolic Extract P. dactylifera (MEPD) (A2=0.4, B2=0.l, C2=0.S2, D2=0.90mg/kg body weight and E2[control]=0.24ml DMSOJ. The administrations were once daily for 112 days.

### 2.5 Sample Collection

On Day 113, 2.Sml of blood samples were collected from each rat through the retro bulbar plexus of the median canthus of the eye into K3-EDTA anticoagulant container for the analysis of peripheral blood parameters using stantard operative procedure as described by Dacie and Lewis.[4] Bone marrow was also collected from some of the rats for cell count.

### 2.6 Statistical Analysis

The Statistical Package for Social Science (SPSS) computer software version 15 was used for data analysis. The results of the tests were analyzed using student's t-test at 95% confidence interval with p-value of SO.OS being considered as significant. The results were expressed as mean ± standard deviation (± SD).

## 3. Results

The results of this study were expressed in tables 1,2 and 3. Table 1 shows the mean and standard deviation of red blood cells (RBC), haemoglobin [Hb}, haematocrit(PCV) and absolute indices of rats after oral administration of graded doses of AEPD and MEPD. Table 2 shows the mean and standard deviation of Total and differential white blood cell count of rats after oral administration of graded doses of AEPD and MEPD. Table 3 shows the mean and standard deviation of Platelets, Reticulocytes and Bone marrow count of rats after oral administration of graded doses of AEPD and MEPD. The results revealed dosage dependent significant increase in Absolute values, RBC, Hb, PCV, Reticulocytes and Platelet count in both aqueous and methanolic extract when compared with the controls ($p<0.OS$, $p<0.OOl$). The total and differential white blood cell counts and bone marrow examination did not differ significantly when compared with the controls ($p>0.OS$).

## 4. Discussion

*Phoenix dactylifera* have been known to posses numerous medicinal properties and is used in the treatment of anaemia, stroke, building up body weight, help in slowing ageing and in treatment of tooth ache. Little or no haematological informations have been recorded on Phoenix dactylifera. The aim of this study was to investigate the haemopoietic activities of crude methanolic and crude aqueous fruit extract of P. dactylifera and its effect on peripheral blood parameters in Wistar rats.

The results revealed dosage dependent significant increase in Absolute values, red blood cells (RBC), Haemoglobin (Hb), Haemtatocrit (PCV), Reticulocytes and Platelet count in both aqueous and methanolic extract when compared with the controls ($p<0.OS$, $p<0.OOl$). The total and differential white blood cell counts and bone marrow examination did not differ significantly when compared with the controls ($p>0.OS$).

Table 1. Mean ± standard deviation of RBC, Hb, PCV and absolute indices of rats after oral administration of graded doses of AEPD and MEPD.

| Group | RBC (X1012/L) | Hb (g/dl) | PCV (%) | MCHC (g/dl) | MCV (Fl) | MCH (Pg) |
|---|---|---|---|---|---|---|
| A1 (0.4mg/kg) AEPD | 8.18±0.11 | 11.7±0.11[afh] | 48.2±0.43 | 24.34±0.05 | 59.1±0.91 | 59.1±0.91 |
| B1 (0.1mg/kg) AEPDC | 7.00±0.83 | 12.2±0.31c | 45.6±2.53 | 27.1±2.62 | 67.5±5.23 | 67.5±5.23 |
| 1 (0.52mg/kg) AEPDD | 6.75±0.85 | 13.8±0.21c | 48.4±2.78 | 28.9±1.64 | 74.0±4.61 | 74.0±4.61 |
| 1 (0.90mg/kg) AEPDE | 6.10±0.86 | 13.4±0.10c | 45.1±2.81 | 29.2±1.51 | 77.0±4.53 | 77.0±4.53 |
| 1(0.24ml) % DMSO | 5.64±0.56 | 9.38±0.53 | 35.4±2.20 | 26.4±0.94 | 64.1±3.88 | 64.1±3.88 |
| ControlA2 (0.4mg/kg) | 8.11±0.11 | 11.5±0.13 | 47.9±1.10 | 23.2±0.51 | 59.5±1.02 | 59.5±1.02 |
| MEPDB2 (0.1mg/kg) | 4.82±0.15 | 12.3±0.10L | 39.4±0.71 | 31.0±0.50 | 82.6±1.85 | 82.6±1.85 |
| MEPDC2 (0.52mg/kg) | 5.63±0.61 | 15.1±0.31L | 46.6±2.60 | 31.1±1.31 | 82.3±3.74 | 82.3±3.74 |
| MEPDD2 (0.90mg/kd) | 6.17±0.52 | 13.3±0.13L | 44.4±2.94 | 30.0±1.55 | 77.9±4.98 | 77.9±4.98 |
| MEPDE2 (0.24ml) % | 6.15±0.52 | 8.7±0.40 | 36.3±2.62 | 25.5±0.67 | 59.8±1.5 | 59.8±1.5 |
| DMSO Control | | | | | | |
| F-ratio | 2.620 | 60.307 | 4.762 | 6.063 | 6.979 | 16.979 |
| p-value | P<0.05* | P<0.001* | P<0.001* | P<0.001* | P<0.001* | P<0.001* |

Where: AEPD= Aqueous Extract of P. Dactylifera; MEPD= Methanol Extract of P. Dactylifera
*= Statistically significant.

Table 2. Mean ± standard deviation of Total and differential white blood cell count of rats after oral administration of graded doses of AEPD and MEPD.

| Group | TWBC (X109/L) | Neutrophil (%) | Lymphocyte (%) | Monocyte (%) | Eosinophil (%) | Basophil (%) |
|---|---|---|---|---|---|---|
| A1 (0.4mg/kg) | 8.62±1.02 | 51.8±3.98 | 46.8±3.92 | 0.40±0.24 | 0.60±0.24 | 0.00±0.00 |
| AEPDB1 (0.1mg/kg) | 6.21±1.23 | 47.2±2.78 | 50.6±2.77 | 0.60±0.40 | 1.40±0.40 | 0.20±0.20 |
| AEPDC1 (0.52mg/kg) | 11.20±2.7 | 55.2±2.77 | 41.4±2.87 | 1.60±0.24 | 1.80±0.37 | 0.00±0.00 |
| AEPDD1 (0.90mg/kg) | 78.32±2.68 | 55.2±3.87 | 42.8±4.02 | 1.40±0.24 | 0.20±0.20 | 0.20±0.20 |
| AEPDE1 (0.24ml) 5% | 6.12±1.13 | 51.2±3.51 | 46.2±3.14 | 1.40±0.40 | 0.80±0.20 | 0.04±0.40 |
| DMSO ControlA2 (0.4mg/kg) | 7.62±0.46 | 55.2±2.49 | 42.2±2.37 | 1.40±0.46 | 0.80±0.40 | 0.60±0.24 |
| MEPDB2 (0.1mg/kg) | 5.94±0.51 | 55.4±1.77 | 46.2±3.43 | 1.40±0.40 | 1.40±0.50 | 0.00±0.00 |
| MEPDC2 (0.52mg/kg) | 4.92±0.24 | 49.0±1.78 | 48.4±2.14 | 1.25±0.25 | 1.00±0.44 | 0.40±0.24 |
| MEPDD2 (0.90mg/kd) | 9.28±1.97 | 52.2±2.03 | 44.6±2.13 | 1.60±0.37 | 1.40±0.40 | 0.20±0.20 |
| MEPDE2 (0.24ml) % | 7.04±0.84 | 44.4±2.90 | 53.2±3.10 | 0.60±0.40 | 1.40±0.46 | 0.00±0.00 |
| DMSO Control | 1.482 | 1.760 | 1.501 | 1.955 | 1.807 | 1.111 |
| F-ratio | p>0.05 | p>0.05 | p>0.05 | p>0.05 | p>0.05 | p>0.05 |
| p-value | | | | | | |

Where: AEPD= Aqueous Extract of *P. Dactylifera*; MEPD= Methanol Extract of *P. Dactylifera*
*= Statistically significant.

Table 3. Mean ± standard deviation of Platelets, Reticulocytes and Bone marrow count of rats after oral administration of graded doses of AEPD and MEPD.

| Group | Platelet (X109/L) | Reticulocyte (%) | Bone marrow count (x$10^6$/femur) |
|---|---|---|---|
| A1 (0.4mg/kg) AEPD | 620.80±18.20 | 0.98±0.13 | 1.50±0.53 |
| B1 (0.1mg/kg) AEPD | 284.80±54.42 | 1.90±0.13 | - |
| C1 (0.52mg/kg) AEPD | 259.20±10.74 | 2.90±0.24 | - |
| D1 (0.90mg/kg) AEPD | 277.80±32.72 | 2.60±0.10 | 0.80±0.05 |
| E1 (0.24ml) 5% DMSO | 134.40±28.45 | 1.00±0.16 | 1.40±0.40 |
| Control | 415.40±73.36 | 1.30±0.12 | 1.40±0.42 |
| A2 (0.4mg/kg) MEPD | 265.80±51.91 | 1.90±0.20 | - |
| B2 (0.1mg/kg) MEPD | 295.00±3.49 | 3.02±0.20 | - |
| C2 (0.52mg/kg) MEPD | 347.20±10.33 | 2.76±0.11 | 1.15±0.15 |
| D2 (0.90mg/kd) MEPD | 104.80±22.21 | 1.30±0.12 | 2.00±0.00 |
| E2 (0.24ml) % DMSO | 14.949 | 28.802 | 1.696 |
| Control | P<0.001* | P<0.001* | p>0.05 |
| F-ratio | | | |
| p-value | | | |

Where: AEPD= Aqueous Extract of P. Dactylifera; MEPD= Methanol Extract of P. Dactylifera
*= Statistically significant.

The phytochemical constituents of Phoenix dactylifera include alkaloids, flavonoids, steroids, tannins, estertepens, carbohydrates, vitamins and phenolic acids.[2,3] This result pattern has indicated that both crude methanolic and crude aqueous fruit extract of P.dactylifera may have stimulatory effect on the bone marrow for the haemopoietic activities. The observed effect may be as a result of the tannin, ascorbic acid [5] and phenol contents of P. dactylifera.[6]

This extract has been reported to be an anti-microbial agent, anti-inflammatory, anti-ulcer, and analgesic.[7] It has also been reported that P. dactylifera is effective in the treatment of gonorrhea.[8] This may probably be as a result of its leucocytic activity and the blood film also revealed mild to moderate lencocytosis with lymphocyte as the predominant leukocyte. The observed significant increase in total white blood cell count agrees with the findings of previous researchers that it has anti microbial activity.[9] The observed significant increase in Hb and PCV agrees with the earlier reports that this extract possess anti anaemic properties. The observed reticulocytosis in this study shows that the extract supports haemopoiesis. Platelet count was also increased showing that this extract can be used to correct bleeding disorder as a result of thrombocytopenia.

## 5. Conclusion

The present study has demonstrated that the crude methanolic and aqueous fruit extracts of P. dactylifera may posses properties capable of supporting increased erythropoietin synthesis by the liver to stimulate the bone marrow to produce more cells ( haemopoiesis) and cause the observed effects on peripheral blood parameters in Wistar rats.

## 6. References

[1] Akah PA, Orisakwe, OE, Gamaniel, KS, Shittu, A. Evaluation of Nigerian Traditional medicines; Effects of some Nigerian folk remedies on peptic ulcer.Journal of Ethno pharmacology. 1998;62: 123-127.

[2] Biglari F, Abbas FM, Alkarkhi, Azhar, M.E . Antioxidant activity and phenolicContent of various Date-palm fruit from Iran Food-Chemistry:2008; 07-11.

[3] Ziouti AC, Modafar EL, Fleuriet AS, Macheix JJ . Pheonix compounds in Date-Palm cultivars sensitive and resistant to Fusarium oxysporum biologia plantarum.Agricultural Food Chemistry 2000; 38:451-457.

[4] Dacie J V , Lewis S M, Practical Hematology (10th edition) Lewis, Bain andBates, Churchill Livingstone, An Imprint of Elsevier. 2006; PP 25 – 57.

[5] Okwu DE . Phytochemicals and Vitamin Contents of Indigenous Spices of South Eastern Nigeria. J. Sus. Agric. Environ. 2004;6 (1) 30-37.

[6] Matol ML, Thomas G, Barbosa Filho, JM. Anti inflammatory action of Tannins Isolated from the bark of Phoenix dactylifera. Journal of Ethno Pharmacology.1985; 13, (3): 289-300.

[7] Adubor MO. Antimicrobial Activity of Phoenix dactylifera Bark. Filoteropia 2007; 72 (3): 286-287.

[8] Barh D, Mazumbar BC. Comparative Nutritive values of palm sapa before an after their partial fermentation and effective use of wild data. Research Journal of Medicine and Medical Sciences 2009; 3: 173-176.

[9] Okwu, D E. Evaluation of the chemical composition of Indigenous Spices and Flavoring Agents. Global J. Pure and App. Sci. 2001;7: 455-459.