

Effect Of Aqueous Leaf Extract Of *Mangifera Indica* On Differential White Blood Cell Count

Ujah, G. A.

Department of Physiology,
University of Calabar, Calabar

Abstract: The effect of aqueous leaf extract of *mangifera indica* on differential white blood cell count was studied. Fifteen (15) adult male wistar rats were randomly divided into three (3) groups of five (5) rats each. Group A served as control and received normal saline. Groups B and C received 300mg/kg and 600mg/kg of the extract respectively. Route of administration in all cases was oral and lasted fourteen (14) days. Results showed an elevation ($P < 0.05$) in lymphocyte count at the two treatment doses, but decreased neutrophil count also at both treatment doses.

Keywords: *mangifera indica*, differential white blood cell count, lymphocytes, neutrophils.

I. INTRODUCTION

The traditional use of plant as herbs for medicinal purposes has been a practise as old as man. In spite of the evolution of modern medicine, and the ground-breaking successes in drug development and therapy, the use of herbs is still a common practise in many parts of the world today. This is even more so in developing countries, where a significant portion of the population still depend on herbal medicine for their primary health care (Ekpe *et al.*, 1990). About eighty percent (80%) of the world population is believed to still practise herbal medicine (Hoareau and Da Silva, 1999). Traditional beliefs (Bannerman *et al.*, 1975) and poverty continue to make many people in Nigeria and most other parts of Africa depend largely on herbs for therapy, as the cost of modern therapeutic measures is still beyond the reach of many. *Mangifera indica* is a large tree belonging to the family anacardiaceae, and found in tropic and subtropic regions of the world. (Ross, 1999; Puravankara *et al.*, 2000). It is commonly known as mango and is grown widely in Nigeria. Some documented effects of extracts of this plant includes; immunomodulation (Makare *et al.*, 2001), anti-allergic (Riviera *et al.*, 2006) and anti-microbial (Zhu *et al.*, 1993; Guha *et al.*, 1996). It is also used in the treatment of malaria, jaundice, cough, asthma, diarrhoea (Agoha, 1981, Madunagu *et al.*, 1990) and typhoid (Faleyimu *et al.*, 2010). *Mangifera*

indica contains vital phytochemicals that confers its pharmacologic importance (Anjaneyulu *et al.*, 1989; El-Mahmood, 2009). Studies have revealed the extract of this plant to increase red blood cell count, packed cell volume and white blood cell count (Nwinuka *et al.*, 2008; Ogebe *et al.*, 2012). Reports on the effect of the extract on different components of the white blood cell are conflicting. This study thus hopes to establish clarity on these conflicting accounts. Also, results leaf extracts of *Mangifera indica* will be used to compare with those from stem bark of the plant.

II. MATERIALS AND METHODS

COLLECTION OF PLANT

Mangifera indica leaves were collected from the botanical garden of the department of biological sciences, Ahmadu Bello University, Zaria. Plant was identified and authenticated in the herbarium and voucher number (1944) deposited.

PREPARATION OF PLANT EXTRACT

Aqueous leaf extract of the plant was prepared according to the method described by Morsi *et al.*, 2010.

EXPERIMENTAL ANIMALS

Fifteen (15) adult male wistar rats weighing between 120g – 135g were purchased from the animal house of the department of biology, federal college of education, Zaria. The animals were acclimatized to the experimental room for two weeks. They were housed in rat cages and fed standard rat chow, and were allowed free access to clean drinking water. Throughout the duration of the study, animals were handled according to the guidelines of the ethical committee on the use of laboratory animals for research.

EXPERIMENTAL DESIGN

Animals were divided into three (3) groups of five (5) rats each. The animals in group A, received normal saline per kg body weight and served as control. Animals in groups B and C were treated with 300mg/kg and 600mg/kg of the extract respectively (Olatunji *et al.*, 2007). The extract was administered daily by oral means for fourteen (14) days.

BLOOD COLLECTION

At the end of the experiment, rats were anaesthetized with chloroform and blood collected by cardiac puncture.

Determination of differential white blood cell count

Differential white blood cell count was determined using methods described by Dacie and Lewis, 1991.

STATISTICAL ANALYSIS

Results obtained were analysed by the one way analysis of variance (ANOVA) using the SPSS statistical package. Statistical significance was set at $P < 0.05$.

III. RESULTS

Results are presented in table 1. Aqueous leaf extract of *mangifera indica* caused a significant decrease ($P < 0.05$) in neutrophil count at both low (300mg/kg) and high (600mg/kg) doses. For the lymphocytes count, a significant increase ($P < 0.05$) was produced by the extract at both high and low doses. There were no significant changes in the counts of monocyte, eosinophil and basophil.

White blood cell	Group A CONTROL (NORMAL SALINE)	Group B 300mg/kg	Group C 600mg/kg
Neutrophil (%)	52.400 ± 1.913	42.600 ± 3.516*	39.200 ± 2.035*
Lymphocyte (%)	38.400 ± 2.040	51.200 ± 3.137*	51.600 ± 1.887*
Monocyte (%)	5.200 ± 0.970	3.200 ± 0.583	5.600 ± 0.812
Eosinophil (%)	3.200 ± 0.490	2.400 ± 0.510	2.600 ± 0.245
Basophil (%)	0.800 ± 0.200	0.600 ± 0.245	0.800 ± 0.200

Table 1: Effect of aqueous leaf extract of *mangifera indica* on differential white blood cell count in adult male wistar rats

Values represent the Mean ± SEM, n = 5. The values with asterisk are significantly different from the control at $p < 0.05$.

IV. DISCUSSION

Results showed a significant decrease in neutrophils at both high and low doses. This is a disagreement with studies conducted by Ogbe *et al.*, 2012. They reported that *mangifera indica* increased neutrophil count. There is however an agreement with the work of Nwinuka *et al.*, 2008, where they reported a decrease in neutrophil count with *mangifera indica* administration. The reduction in neutrophil count may be as a result of tannins. Tannin is a phytochemical present in *mangifera indica* (Madunagu *et al.*, 1990). In a study by Marzo *et al.*, 1990, tannins fed to chickens impaired their immune function. The total white blood cell count was reduced. In the present study, tannin in extract of *mangifera indica* may have targeted neutrophil mostly, reducing their numbers. Lymphocyte count however showed a significant increase at both high and low doses. This is an agreement with previous studies (Nwinuka *et al.*, 2008; Ogbe *et al.*, 2012). *Mangifera indica* extract have been reported to have immunostimulant property (Makare *et al.*, 2001). This immunostimulant effect may have manifested as increase in lymphocyte count. Results from the leaf extract of *mangifera indica* are similar to those from stem bark. While the extract increased lymphocyte count on the one hand, it decreased neutrophil count on the other. Care must therefore be taken in the use of the extract of this plant in the treatment of infections as neutrophils form the first line of defence against infections (Crawford *et al.*, 2003).

REFERENCES

- [1] Agoha, R.C.(1981). Medicinal plants of Nigeria: offset. *Drukkerij faculteit der wiskunde en Natuurwetens chappen, Nijmegen, Netherlands*
- [2] Anjaneyulu, V., Suresh, J.B.M. and Connolly, J.B. (1989).Phytochemistry -Antibacterial activity of terpenoidal fractions from *Anogeissus leiocarpus* and *Terminalia avicennioides* against community acquired infections. *African Journal of Pharmacy and Pharmacology* 3(1). 022-025.
- [3] Bannerman, R. H. A., Ummina, V. D. and Koko, U.(1975). Indigenous system of medicine in India. In: *Alternative Approaches to Meeting basic Health needs in developing countries*, WHO, Geneva, pp:84-19.
- [4] Crawford, J., Dale, D. C. and Lyman, G. H. (2008). Chemotherapy-induced neutropenia. *Cancer* 100 (2): 228-237
- [5] Dacie, J.V. and Lewis, S.M.(1991). *Practical haematology* 7th Ed ELBS with Churchill Livingstone, England, pp: 37-85.
- [6] Ekpe, E.D., Eban, R.V.B. and Madunagu, B. E.(1990). Anti- microbial activity of four medicinal plants on pathogenic Bacteria and phytopathogenic fungi. *West Af. J. Biol. Appl'd Chem.*, 35: 2-5
- [7] El-Mahmood, M. A. (2009). Antibacterial efficacy of stem bark extracts of *Mangifera indica* against some bacteria associated with respiratory tract infections.
- [8] Faleyimu O.I., Akinoyemi O. and Idris Y.M. (2010). Survey of Forest Plants used in the Traditional Treatment

- of Typhoid Fever in Chikun Local Government of Kaduna State Nigeria. *International Journal of Biochemical and Health Sciences* (6) 1
- [9] Guha, S., Ghosal, S. and Chattopadhyay, U. (1996). Antitumor, immunomodulatory and anti-HIV effect of mangiferin, a naturally occurring glucosylxanthone. *Chemotherapy* 42: 443-451
- [10] Hoareau, L. Da silva, E. J. (1999). *Journal of Biotechnology*. 2 (2): 56 – 70
- [11] Madunagu, B.E., Ebanu, R.U.B. and Ekpe, E.D.(1990). Antibacterial and Antifungal Activity of some medicinal plants of Akwa Ibom state. *West Af. J. Biol. Appl'd Chem.*, 35: 25-30
- [12] Makare, N., Bodhankar, S. and Rangari, V. (2001). Immunomodulatory activity of alcoholic extract of *mangifera indica* L. in mice. *Journal of Ethnopharmacology*. 78 (2-3): 133-137
- [13] Marzo, F., Tosar, A. and Santidiran, S. (1990). Effect of tannic acid on the immune response of growing chickens. *Journal of animal science*. 68(10):3306-3312.
- [14] Morsi, R. M. Y., El-Tahan, N. R. and El-Hadad, A. M. A. (2010). Effect of aqueous extract *mangifera indica* leaves as functional foods. *Journal of Applied sciences Research* 6(6): 712-721
- [15] Nwinuka, N. M., Monanu, M. O. and Nwiloh, B. I. (2008). Effect of aqueous extract of *mangifera indica* L. (mango) stem bark on haematological parameters of normal albino rats. *Pakistan journal of nutrition*. 7(5):663-666.
- [16] Ogbe, R. J., Adenkola, A. Y. and Anefu, E. (2012). Aqueous ethanolic extract of *mangifera indica* stem bark effect on the biochemical and haematological parameters of albino rats. *Archives of applied science research* 4(4): 1618 – 1622.
- [17] Olatunji, B., Ogbewey, L. I. and Awobajo, F. O. (2007). The effect of aqueous extract of *mangifera indica* (mango) leaves on female reproductive functions in Sprague-Dawley rats. *Physiological society* 6(7)
- [18] Puravankara, D., Bohgra, V. and Sharma, R.S. (2000). Effect of antioxidant principles isolated from mango (*Mangifera indica* L.) seed kernels on oxidativestability of buffalo ghee (Butter-Fat). *Journal of Science of Food and Agriculture* 80: 522-526.
- [19] Rivera, D.G., Balmaseda I.H. and Leon A.A. (2006). Anti-allergic properties of *Mangifera indica* L. extract (Vimang) and contribution of its glucosylxanthone mangiferin. *Journal of Pharmacy and Pharmacology* 58: 385-392
- [20] Ross, I.A. (1999). Medicinal Plants of the world, Chemical constituents, Traditional and Modern Medicinal Uses, Humana Press, Totowa, pp 197-205. *Scientific Research and Essay*.
- [21] Zhu, X.M., Song, J.X. and Huang, Z.Z. (1993). Antiviral activity of mangiferin against herpes simplex virus type 2 in vitro. *Zhongguo Yaoli Xuebao* 14: 452-454.