

Effects of Aqueous Pod Extract of *Acacia nilotica* on White blood cells, Platelets and Clotting time in albino Rats

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ABSTRACT

OBJECTIVE: The study was design to determine the effects of aqueous pod extract of *A. nilotica* on some hematological parameters in albino rats.

METHODS: The Pods of *Acacia nilotica* were air dried at room temperature for three (3) weeks. The crushing of the pods was done in the laboratory using pestle and mortar. 200 grams of powdered pod was weighed and mixed with distil water in conical flask. The mixture was shaken and boiled for 1 hour before it was filtered. The filtrate was then concentrated in a rotatory evaporator and stored at 4°C until used. 50, 100, 200 and 400 mg/kg of the aqueous pod extract was administered to the rats daily for 21 days and the WBC count, platelet count and clotting time was taken at weekly interval.

RESULTS: The aqueous extract of *A. nilotica* in treated rats found to significantly ($p < 0.05$) increased WBC count when compared to the control group. The increased was more in the group treated with the highest dose of the extract. Exposure of rats to various doses of the pod extracts of *A. nilotica*, significantly ($p < 0.05$) increased the mean platelets values, which appears to be dose dependent. The clotting time was significantly ($p < 0.05$) increased in all the groups treated with various doses of the extract at day 21.

CONCLUSIONS: The results of this study showed that aqueous pod extract of *A. nilotica* was found to have immuno stimulatory effects and anti-haemostatic properties and it usage in folk

medicine for treatment of various ailments is justified.

Keywords: *A. nilotica* aqueous; Pod extract; Haematological parameters.

INTRODUCTION

Acacia nilotica (English Names; thorn tree, wattles, Babul, Black babul, Indian Arabic gum), a member of the Family; *Fabaceae*. The pods of *A. nilotica* are dark green containing 8-12 ovoid seeds with a characteristics beaded necklace appearance¹. The root is usually brown in colour and of different sizes, depends on the proximity to the ground level.

Acacia nilotica is one of the plants used by traditional medical practioner in Nigeria and many other African countries¹. Although modern medicine are available in these countries, in north eastern Nigeria herbal medicine has become part of the people(s) culture with greater percentage of the natives and local people depend mostly on the herbs to treat various disease ailments², because it is regarded as been safe and harmless³.

Some acacia species produced tannins and alkaloid chemicals as defensive compounds to deter insects and mammalian herbivores⁴. Some of these alkaloids were toxic to livestock, while others affect mood and mental abilities of an individual⁴. Among are secondary metabolites such as glycosides, tannins, terpenes, phenols, saponins^{4,5}, the plant is also rich in tryptophan, cystine, methionine, threonine and lysine.

The leaves, pods, bark and roots of *A. nilotica* were used to treat different ailments. African zulus use the bark to treat cough, diarrhoea, dysentery and leprosy¹. While in Kenya, Masai used the root and bark decoction to alleviate mood. The powdered pods are used by Egyptians to

treat diabetes mellitus⁶. In Ayurvedic medicine, the stem bark is considered a remedy for treating premature ejaculation⁷. Many herbs including the decoction from the pods of *Acacia nilotica* have been used in folk medicine for the control of diarrhoea⁵. *Acacia nilotica* although widely used in north eastern Nigeria for treatment purposes, it has not been scientifically evaluated for its use and toxicity. The scientific investigation of *Acacia nilotica* could support its reported efficacy in herbal medicine. Therefore the study was design to determine the effects of aqueous pod extract of *A. nilotica* on some haematological parameters in albino rats.

MATERIALS AND METHODS

Plant Collection, Identification and Extract Preparation

Fresh pods of *Acacia nilotica* were collected from Lai –Lai grazing reserve, Potiskum Local Government Area of Yobe State and submitted for identification by the botanist at Department of Biological Sciences, University of Maiduguri, and a voucher specimen was deposited at the Department of Veterinary Physiology and Pharmacology herbarium, University of Maiduguri, Nigeria.

The pods were air dried at room temperature for three weeks. The crushing of the pods was done in the laboratory using pestle and mortar, after which it was ground into powder. Two hundred grammes (200gm) of the powdered pod was weighed and introduced into a conical flask and 1

litre of distilled water was added thereafter. The mixture was then shaken and allowed to stand for 30 minutes, after which it was boiled for one hour, cooled and shaken vigorously, before filtration using whatman No. 1 filter paper. The filtrate was concentrated in a rotatory evaporator and stored at 4°C until used, and the yield was 6.75%.

EXPERIMENTAL ANIMALS

Wister albino rats of both sexes were used for the experiments. They were kept in plastic cages and allowed to acclimatize to the laboratory environment for a period of two weeks before the commencement of the experiments. They were fed with growers mash (Sanders Nig. Ltd, Jos) and water provided *ad libitum*. The animals were handled according the international guiding principles for biomedical research involving animals⁸.

Effects of Prolonged Oral Administration of Aqueous Pod Extract of *A. nilotica* on some Haematological Parameters

Twenty five (25) Wister albino rats of both sexes (weighing between 140-160g) were randomly selected and divided into five groups of five rats each, were used for the studies. Groups II, III, IV and V were treated orally with 50 mg/kg, 100 mg/kg, 200 mg/kg and 400 mg/kg of aqueous pod extract of *Acacia nilotica* respectively for a period of 21 days. While Group I (control) received distilled water for the same period. The body weights of the rats were obtained prior to administration of the extract and thereafter at weekly interval. Blood samples were collected from the tail vein of each rats prior to extract administration using the method of⁹ as previously described with slight modifications, and weekly thereafter, the blood samples collected were used for the determination of haematological parameters such as the white blood cells

count (WBC), platelets count and clotting time weekly.

Statistical analysis

All values were expressed as Mean \pm Standard Deviation, one way analysis of variance (ANOVA) was used to analyse the extent of variation between groups and p values equal to or less than 0.05 were considered significant¹⁰. Graphpad instat 3.0 for windows USA[®] computer software was used to analyse the data.

RESULTS AND DISCUSSION

The effect of aqueous pod extract of *A. nilotica* on some haematological parameters was investigated in rats. Treatment with aqueous pod extract for 21 days significantly ($p < 0.05$) increased the WBC counts of the treated rats (Table I) when compared to the control group. The increase in WBC count was more in the group treated with the highest dose of the extract. The crucial role of WBC in body defence mechanism against infection and tissue damage has been reported¹¹ this suggest that the aqueous pod extract of *A. nilotica* contain some active principle that can stimulates leucocytes production which could serves as an immune booster to the animal. The findings in this study were in agreement with earlier report by¹² that many biological compounds have been found to stimulate immune function.

The result of platelets count following administration of extract to the rats is shown in Table II. The exposure of rats to various doses of *A. nilotica* aqueous pod extract resulted in significant ($p < 0.05$) increase in platelet count when compared to the control group. The increase in platelets counts of treated rats appears to be dose dependent. Plant extract rich in tannins, alkaloid saponins and glycosides were reported to cause augmented platelet count^{13,15}. This means that pod extract of *A. nilotica* may be useful for

treatment of thrombocytopenic disorders; which may also serve as an alternative to platelet transfusion. The result of treatment with the pod extract of *A. nilotica* on clotting time is presented in Table III. The fact that the extract of *A. nilotica* increased the mean clotting time in the treated rats agree with previous report by^{14, 16} which also suggest that pod extract of *A. nilotica* contain fibrolytic and antihemostatic properties. Extract with this kind of property could be useful in the management of thrombosis especially removal of clots in women after delivery^{14,17}. The clotting time was significantly ($p<0.05$) increased in the groups treated with all doses of the extract at day 21 when compared to the control group. The percentage increases were 102.4, 74.4, 102.3 and 121.6% in rats treated with 50, 100, 200 and 400mg/kg doses of the extract respectively.

CONCLUSIONS

The results of this study showed that *A. nilotica* aqueous pod extract was found to have immuno stimulatory effects and also appear to have fibrolytic and antihemostatic properties, which could be helpful in the management of thrombosis especially removal of blood clots in women following delivery. Therefore, the extract of *A. nilotica* is relatively safe and its usage for treatment of various ailments for medicinal purpose is justified.

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Table 1. Effect of aqueous pod extract of *Acacia nilotica* on mean^b total white blood cell ($\times 10^9/L$) in rats treated with the extract for 21 days

Extract treatment(mg/kg)	Treatment Days			
	0	7	14	21
Control	8.60 \pm 1.13	8.60 \pm 1.12	8.60 \pm 1.10	8.60 \pm 1.10
50	9.30 \pm 4.20	8.50 \pm 1.50	10.9 \pm 1.10*	12.5 \pm 1.10*
100	9.20 \pm 3.20	9.80 \pm 1.20*	10.7 \pm 1.40*	14.80 \pm 2.20*
200	8.80 \pm 3.90	9.80 \pm 1.30*	12.2 \pm 2.10*	16.70 \pm 2.30*
400	9.10 \pm 2.90	9.9 \pm 1.70*	13.0 \pm 2.30*	17.80 \pm 2.60*

*Mean \pm Standard deviation based on five observations. Values in the same row with different superscripts are significantly ($p < 0.05$) different

Table 2. Effect of aqueous pod extract of *Acacia nilotica* on mean^b Platelets ($\times 10^9/L$) in rats treated for 21 days respectively

Extract treatment(mg/kg)	Treatment Days			
	0	7	14	21
Control	105 \pm 6.12	101 \pm 6.11	100 \pm 6.12	105 \pm 6.12
50	106 \pm 6.75	117 \pm 5.70*	113 \pm 2.70*	143 \pm 4.6*
100	105 \pm 7.70	151 \pm 4.12*	146 \pm 4.20*	146 \pm 4.0*
200	111 \pm 6.70	163 \pm 5.70*	160 \pm 5.00*	160 \pm 5.0*
400	104 \pm 4.90	181 \pm 5.54*	179 \pm 4.20*	179 \pm 4.1

*Mean \pm Standard deviation based on five observations. Values in the same row with different superscripts are significantly ($p < 0.05$) different.

Table 3. Effect of aqueous pod extract of *Acacia nilotica* on mean^b Clotting times (Sec.) in rats treated for 21 days respectively

Extract treatment(mg/kg)	Treatment Days			
	0	7	14	21
Control	44.2 \pm 5.2	45.8 \pm 5.23	48.2 \pm 6.1	51.2 \pm 8.2
50	46.8 \pm 5.2	45.8 \pm 5.23	48.2 \pm 6.1	83.8 \pm 9.6*
100	53.2 \pm 9.9	52.2 \pm 10.4	53.2 \pm 10.1	92.6 \pm 9.0*
200	55.2 \pm 12.9	55.2 \pm 12.9	55.6 \pm 18.1	111 \pm 20*
400	52.6 \pm 7.3	52.6 \pm 5.3	51.2 \pm 13.7	116 \pm 9.5*

*Mean \pm Standard deviation based on five observations. Values in the same row with different superscripts are significantly ($p < 0.05$) different.