THE COMBINED EFFECTS OF AQUEOUS EXTRACT OF *Ficus sycomorus* L. (MORACEAE) STEM BARK AND *Nigella sativa* L. (RANUNCULACEAE) SEEDS ON HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN RABBITS

[1]SANDABE, Umar Kyari, [2]ABDURRAHAMAN, Fanna, [1]GONIRI, Bukar and [1]BABA, Usman
[1]Department of Veterinary Physiology and Pharmacology, University of Maiduguri, PMB 1069, Maiduguri, Nigeria
[2]Department of Chemistry, University of Maiduguri, PMB 1069, Maiduguri, Nigeria

Corresponding Author: Sandabe, U. K. Department of Veterinary Physiology and Pharmacology, University of Maiduguri, PMB 1069, Maiduguri, Nigeria. Email: usandabe@yahoo.com Phone: +2348023825876

ABSTRACT

The stem bark of Ficus sycomorus and the leaves of Nigella sativa were collected; dried and extracted using distilled water and filter paper, to study the effects of combination of these extracts on hematological and biochemical parameters in rabbits. Twenty rabbits weighing between 1000 and 1,200 g were randomly separated into four groups of five rabbits each. Group A rabbits were injected with Ficus sycomorus (200 mg/kg), group B; Nigella sativa (100 mg/kg), group C; combination of F. sycomorus (200 mg/kg) and N. sativa (100 mg/kg) while group D rabbits were given distilled water and served as control. Blood (1.2 ml) was collected for analyses of hematological and biochemical parameters using standard methods. Bleeding and clotting times were also measured using ear vein puncture and capillary tube methods respectively. The PCV, Hb and RBC values showed various irregular differences (P < 0.05) due to extracts treatments. The differential leucocytes counts and the biochemical parameters did not show any differences (P > 0.05). The bleeding and clotting times (min.) decreased (P<0.05) due to various extracts treatments compared with non-treated group that was given distilled water. Therefore it was concluded that the extracts either alone or in combination could not affect the peripheral blood adversely and it is non toxic to liver, kidney and muscles as indicated by the biochemical analyses and there was no apparent advantage in combining the two extracts as far as these parameters were concerned.

Keywords: *Ficus sycomorus*; *Nigella sativa*; Haematology, Biochemical values

INTRODUCTION

Ficus sycomorus linn, indigenous names are tarmu (Kanuri), Baure (Hausa) and Kamda (Babur/Bura), belongs to the class Moraceae which is widely distributed in tropical West Africa (George and Lawrence, 1961). It is a tree of about 60 ft high with pale trunk and widespread crown pilose branchlets (Hutchinson and Dalziel, 1957). *F. sycomorus* in combination with other herbs was shown to have an effect on the central nervous system (Abdurrhman, 1992). Sandabe *et al*. (2003) showed that the aqueous extract possess a sedative effect and an anti convulsive properties in rats. Simple sugars, tannins, saponins, alkaloids and flavone aglycones have been identified in the plant (Sandabe *et al* 2006). Extracts obtained from the fruits, leaves, stem bark, and root bark usually administered in the form of infusions, decoctions, tinctures, syrups and lotions have been used in the treatments of wide range of diseases and disorders in various African countries (WHO, 1992). The acute toxicity studies of the plant showed that the LD_{50} was 720 mg/kg body weight indicating low toxicity (Sandabe *et al.,* 2004).

The natives around the North East region of Nigeria use this plant in combination with other medicinal plants, especially *Nigella sativa* L. *Nigella sativa* whose indigenous names are Kamansulum (Kanuri) and Habbatussauda (Hausa) is a member of Ranunculaceae and grows wildly in Mediterranean countries. It is a grassy plant with green to blue flowers and small black seeds, which grows in temperate and cold climate areas (Boskabady *et al.,* 2004). Several therapeutic effects of the seed, including those relating to on digestive disorders, gynecologic disorders, asthma and dyspnea have reported Sharafkhandy (1990). Combination of herbs in traditional medical practice is very common. Abdurrhman (1992) had earlier shown that *Ficus sycomorus* in combination with other herbs produced sedative effect on central nervous system.

Haematological parameters are of immense value in evaluating the responses of animals to therapy (Woerpel and Rosskopt, 1984). The aim of this study was to examine the effect of combined aqueous extracts of *F. sycomorus* and *N. sativa* on hematological and biochemical parameters in rabbits.

MATERIALS AND METHODS

Extract Preparation: Fresh stem barks of *F. sycomorus* and *N. sativa* were collected from Maiduguri, Borno State, Nigeria. Collected plants were identified and authenticated by Curator in the Department of Biological Sciences, University of Maiduguri, Maiduguri, Nigeria and voucher specimens were kept in herbarium and labeled Chem., 732 A

Table 1: Effect of aqueous extracts of *Ficus sycomorus* and *Nigella sativa* and their combination on some hematological parameters in rabbits

Parameters	Extract and dose (mg/kg)	Days of treatment			Days post-treatment
		7	14	21	14
PCV (%)	*F. sycomorus* (200)	31.25 ± 1.50*[a]	32.75 ± 0.76*	32.00 ± 1.41*	31.25 ± 2.63
	N. sativa (100)	29.50 ± 0.58	32.00 ± 0.82	31.00 ± 2.71*	31.50 ± 2.38
	F. s (200) + *N. s* (100)	27.57 ± 2.23	32.00 ± 1.15	28.25 ± 0.96	31.00 ± 2.00
	Distilled water	27.00 ± 3.16	30.50 ± 0.58	28.00 ± 1.41	31.25 ± 1.26
Hb (gm/dl)	*F. sycomorus* (200)	11.83 ± 0.85*[a]	11.20 ± 0.22	11.63 ± 0.26	11.50 ± 0.58
	N. sativa (100)	11.45 ± 0.64*[a]	11.50 ± 0.58*	13.00 ± 0.66	11.00 ± 0.82
	F. s (200) + *N. s* (100)	10.40 ± 0.43	11.58 ± 0.43	11.10 ± 0.66	11.00 ± 0.00
	Distilled water	10.53 ± 0.50	10.75 ± 0.50	11.33 ± 0.47	11.33 ± 0.47
RBC (10^{12}/L)	*F. sycomorus* (200)	05.74 ± 0.76*[a]	04.51 ± 0.82	05.78 ± 0.37*	04.99 ± 0.49
	N. sativa (100)	02.91 ± 0.77	04.32 ± 0.38	03.79 ± 0.90	04.49 ± 0.49
	F. s (200) + *N. s* (100)	03.62 ± 0.54	04.46 ± 0.54	03.99 ± 0.79	04.49 ± 0.59
	Distilled water	04.21 ± 1.35	04.41 ± 0.98	03.77 ± 0.16	05.05 ± 0.64
WBC (10^9/L)	*F. sycomorus* (200)	07.48 ± 0.63	07.50 ± 1.22	08.04 ± 0.49	07.40 ± 1.52
	N. sativa (100)	07.56 ± 0.93	07.41 ± 0.69	07.54 ± 0.41	07.50 ± 0.53
	F. s (200) + *N. s* (100)	06.60 ± 0.33	06.84 ± 0.33	07.36 ± 0.70	07.58 ± 1.65
	Distilled water	06.88 ± 0.37	06.49 ± 0.37	06.82 ± 0.92	06.50 ± 0.83

*[a] *P<0.05 compared with F.s + N.s * P<0.05 compared with control*

Table 2: Effect of aqueous extracts of *Ficus sycomorus* and *Nigella sativa* and their combination on differential leucocytes counts in rabbits

Parameters (10^9/L)	Extract and dose (mg/kg)	Days of treatment			Days post-treatment
		7	14	21	14
Neutrophils	*F. sycomorus* (200)	2.13 ± 1.09	1.42 ± 0.22	1.54 ± 0.49	2.75 ± 0.90
	N. sativa (100)	2.12 ± 0.31	1.42 ± 0.22	1.66 ± 0.60	2.45 ± 0.91
	F. s (200) + *N. s* (100)	1.56 ± 0.60	1.36 ± 0.15	1.57 ± 0.40	2.78 ± 0.60
	Distilled water	1.40 ± 0.74	1.58 ± 0.67	1.78 ± 0.65	1.85 ± 0.19
Eosinophils	*F. sycomorus* (200)	0.24 ± 0.16	0.22 ± 0.11	0.24 ± 0.18	0.17 ± 0.76
	N. sativa (100)	0.21 ± 0.07	0.15 ± 0.05	0.14 ± 0.04	0.02 ± 0.08
	F. s (200) + *N. s* (100)	0.09 ± 0.04	0.09 ± 0.04	0.11 ± 0.01	0.17 ± 0.04
	Distilled water	0.14 ± 0.07	0.13 ± 0.03	0.14 ± 0.05	0.15 ± 0.02
Basophils	*F. sycomorus* (200)	0.19 ± 0.14	0.27 ± 0.01	0.17 ± 0.05	0.16 ± 0.03
	N. sativa (100)	0.17 ± 0.03	0.25 ± 0.03	0.13 ± 0.03	0.13 ± 0.01
	F. s (200) + *N. s* (100)	0.11 ± 0.02	0.25 ± 0.03	0.15 ± 0.01	0.14 ± 0.05
	Distilled water	0.13 ± 0.02	0.28 ± 0.04	0.13 ± 0.04	0.13 ± 0.01
Monocytes	*F. sycomorus* (200)	0.18 ± 0.05	0.19 ± 0.05	0.17 ± 0.05	0.19 ± 0.04
	N. sativa (100)	0.17 ± 0.03	0.20 ± 0.03	0.22 ± 0.03	0.16 ± 0.03
	F. s (200) + *N. s* (100)	0.20 ± 0.05	0.22 ± 0.07	0.19 ± 0.03	0.17 ± 0.02
	Distilled water	0.21 ± 0.03	0.21 ± 0.03	0.21 ± 0.05	0.18 ± 0.06
Lymphocytes	*F. sycomorus* (200)	5.89 ± 2.15	4.02 ± 1.09	5.89 ± 2.30	4.39 ± 0.70
	N. sativa (100)	5.19 ± 0.74	3.78 ± 0.50	3.69 ± 0.30	4.71 ± 0.73
	F. s (200) + *N. s* (100)	4.59 ± 0.21	3.31 ± 0.26	3.64 ± 0.48	4.52 ± 0.99
	Distilled water	4.75 ± 0.25	3.58 ± 0.24	4.21 ± 0.69	3.53 ± 0.59

** P>0.05. Variation among columns*

and Vet. 584 B respectively. The sun dried stem bark of *F. sycomorus* was crushed into fine powder. Two hundred grams of the powdered stem bark were mixed with one litre of distilled water in a beaker and heated at 65° C for 30 minutes. It was allowed to cooled then filtered using Whatman No.1 filter paper. The filtrate was concentrated to 0.2 g/l in rotary evaporator and stored at 4°C pending used. Also the seeds of the *N. sativa* were crushed into fine powder. One hundred and fifty grams of the powdered stem bark were mixed with one litre of distilled water in a beaker and heated at 65° C for 30 minutes. It was allowed to cooled then filtered using Whatman No.1 filter paper. The filtrate was concentrated to 0.1 g/l in rotary evaporator and stored at 4° C pending used.

Animals: Twenty rabbits of both sexes weighing between 1000 and 1,200 g were purchased from a rabbitry, University of Maiduguri, and kept in a deep litter housing system, with good ventilation. They were fed commercial feeds (Saunders Nigeria Ltd, Lagos, Nigeria) and water was provided *ad libitum.* They were allowed to adjust to the environment for three weeks before the commencement of the experiment. During the acclimatization period, thorough physical, parasitological and physiological assessments of the rabbits were carried out. All animals were handled according to guidelines for research and evaluation of traditional medicine using animal models (WHO, 2000) and the International guiding principles for biomedical research involving animals (CIOMS 1985).

Treatments: The rabbits were randomly separated into four groups of five rabbits each. While group A rabbits were given aqueous extract of *F. sycomorus* stem bark at dose of 200 mg/kg, group B rabbits

were given aqueous extract of *N. sativa* seed at dose of 100 mg/kg and those in group C were given both *F. sycomorus* and *N. sativa* extracts at dose of 200 mg/kg and 100 mg/kg respectively and rabbits in group D were given distilled water and served as control. All the administrations were given intraperitoneally. The treatment continued for three weeks and withdrawn for two weeks, when the experiment lasted. Blood (1.2 ml) was collected from the ear vein with 5 ml sterile syringe weekly using 1 mg/ml EDTA as anticoagulant for the determination of blood and biochemical parameters. A capillary tube is filled with a blood for the determination of clotting time.

Haematological Parameters: Red blood cells (RBC) and White blood cells (WBC) counts were done using haemocytometer method (Schalm *et al.*, 1975). Thin blood films stained with Giemsa was used for differential leucocytes counts (DLC), packed cell volume (PCV) was determined by micro-haematocrit method and haemoglobin (Hb) concentration was determined using Sahlis method (Brown, 1976).

Biochemical Parameters: Serum alanine and aspartate aminotransferase (ALT, AST) and alkaline phosphatase (ALP) were estimated colorimetrically using ALT, AST and ALP test kits respectively (Randox Laboratories Limited, U.K.). Serum total protein, urea and creatinine concentrations were analyzed using procedures described by Cole (1980).

Bleeding Time: Each rabbit was restrained on a table by holding it around the shoulder with the help of an assistant. The ear vein was punctured with the aid of sterile lancet blade. A stop watch was set at the moment when blood started appearing and a filter paper was used to absorb blood from the wound after every thirty seconds. Care was taken not to touch the wound site as this may alter the bleeding time. The stop watch was switched off when no blood dropped on the filter paper, indicating that the bleeding has stopped and the time interval was recorded as the bleeding time (Quick, 1975).

Blood Clotting Time*:* A capillary tube of approximately 15 cm long and 1 mm in diameter was used. The ear vein was punctured and blood sucked into the capillary tube. The time when the tube was filled was noted and holding the tube between the thumb and the index finger of both hands, the capillary tube was broken after every thirty seconds, until fibrin strand was seen between the gaps. The time between the filling of the capillary tube and the formation of fibrin strand was recorded as the clotting time (Bush, 1975).

Data Analysis: The data obtained was expressed as mean and standard deviation (Mean $\pm$ SD), the difference among the groups was assessed by ANOVA using GraphPad InStat Version 3.0 Windows, USA, computer statistical software.

RESULTS

The extract of *F sycomorus* was reddish brown and tasteless. The yield was 7.1% (w/w). The extract of *N. sativa* was black and the yield was 6.3% (w/w). The PCV values were higher for *F. sycomorus* when compared with the values for combined *F sycomorus* and *N. sativa* treatments ($P<0.05$), but showed no difference when compared with the control (Table 1). At day 14 and day-21, *F. sycomorus* have significantly higher values than the rest of the treatments ($P < 0.05$). After the withdrawal of the treatments, no difference could be noticed ($P > 0.05$). The Hb values were significantly higher for *F. sycomorus* and *N. sativa* treatments when compared with the combined treatment ($P < 0.05$), but at day-14 *N. sativa* has higher values ($P < 0.05$) than the control. The RBC values were significantly higher for *F. sycomorus* when compared with combined treatments and at day-21 it had higher values than control ($P < 0.05$). All treatments did not show any differences on the WBC counts ($P > 0.05$). Daily administrations of the *F. sycomorus*, *N. sativa* and their combination could not produce any effect on the differential leucocytes counts (Table 2) and on some biochemical parameters (Table 3). The bleeding and clotting times decreased ($P < 0.05$) due to various extract treatments compared with the non-treated group that was given distilled water (Table 4).

DISCUSSION

The results of the study with the daily oral administration for 21 days of the combination of aqueous extracts of *F. sycomorus* stem bark and *N. sativa* seeds to rabbits at dose of 200 mg/kg and 100 mg/kg respectively, showed irregular increases in PCV, Hb, and RBC. This is an indication that the extracts and their combination may stimulate erythropoiesis. Our findings did not agree with that of Sandabe *et al.* (2002) on the prolonged effects of *Ficus sycomorus* stem bark aqueous extract on haematological parameters of rats. The difference in observation may be animal species dependent. Furthermore, no adverse effect of the extract treatments was observed on the liver, bones muscles and renal functions as no changes were recorded for all the examined biochemical parameters. Sandabe *et al*. (2002) had earlier reported no changes in biochemical parameters arising to prolonged oral administration of *Ficus sycomorus* stem bark aqueous extract to rat model.

Apparently the combination of these two extracts did not exhibit any advantage over the use of either of the extract. This could be seen in the PCV values, when *F. sycomorus* have higher values than the combined extracts ($P < 0.05$) at day 7 and day 21 and the Hb and RBC values when *F. sycomorus* and *N. sativa* separately higher values than the combined treatments.

The extracts treatments including the combinations have shown to decrease the bleeding time and according to Cole (1980), bleeding time can be decreased either by tempering with the integrity

Table 3: Effect of aqueous extracts of *Ficus sycomorus* and *Nigella sativa* and their combination on some biochemical parameters in rabbits

Parameters (10^9/L)	Extract and dose (mg/kg)	Days of treatment			Days post-treatment
		7	14	21	14
Total Protein (g/dl)	*F. sycomorus* (200)	06.32 ± 0.22	06.32 ± 0.22	06.52 ± 0.08	06.44 ± 0.09
	N. sativa (100)	06.50 ± 0.16	06.16 ± 0.33	06.46 ± 0.05	06.22 ± 0.28
	F. s (200) + *N. s* (100)	06.56 ± 0.09	06.60 ± 0.12	06.54 ± 0.15	06.40 ± 0.17
	Distilled water	06.40 ± 0.05	06.50 ± 0.07	06.46 ± 0.11	06.54 ± 0.05
Creatinine (mmol/l)	*F. sycomorus* (200)	74.98 ± 0.28	74.78 ± 0.28	74.68 ± 0.40	74.76 ± 0.36
	N. sativa (100)	75.14 ± 0.11	75.08 ± 0.28	75.18 ± 0.26	75.08 ± 0.18
	F. s (200) + *N. s* (100)	75.14 ± 0.11	74.72 ± 0.36	74.86 ± 0.25	74.72 ± 0.54
	Distilled water	74.96 ± 0.17	75.12 ± 0.22	75.06 ± 0.15	74.80 ± 0.50
Urea (mg/dl)	*F. sycomorus* (200)	16.88 ± 0.30	16.82 ± 0.24	16.74 ± 0.15	16.80 ± 0.27
	N. sativa (100)	16.92 ± 0.28	16.70 ± 0.21	17.04 ± 0.13	16.96 ± 0.20
	F. s (200) + *N. s* (100)	16.92 ± 0.26	16.88 ± 0.25	16.94 ± 0.11	17.14 ± 0.27
	Distilled water	16.94 ± 0.13	16.78 ± 0.33	16.98 ± 0.16	16.94 ± 0.15
ALP (u/l)	*F. sycomorus* (200)	98.68 ± 0.38	98.58 ± 0.65	98.98 ± 0.30	99.00 ± 0.73
	N. sativa (100)	98.60 ± 0.92	98.80 ± 0.37	98.42 ± 0.91	98.68 ± 0.50
	F. s (200) + *N. s* (100)	98.68 ± 0.40	98.70 ± 0.45	99.08 ± 0.26	98.84 ± 0.32
	Distilled water	98.70 ± 0.18	98.56 ± 0.44	98.70 ± 0.32	98.74 ± 0.48
AST (u/l)	*F. sycomorus* (200)	68.66 ± 0.44	68.18 ± 0.60	68.70 ± 0.43	68.64 ± 0.45
	N. sativa (100)	68.40 ± 0.90	68.40 ± 0.55	68.40 ± 0.55	68.70 ± 0.45
	F. s (200) + *N. s* (100)	68.44 ± 0.52	68.00 ± 0.70	68.20 ± 0.57	68.80 ± 0.45
	Distilled water	68.80 ± 0.27	68.50 ± 0.50	68.50 ± 0.50	68.60 ± 0.55
ALT (u/l)	*F. sycomorus* (200)	60.46 ± 0.85	60.46 ± 0.99	60.80 ± 0.91	60.86 ± 0.22
	N. sativa (100)	61.02 ± 0.29	60.82 ± 0.54	61.08 ± 0.26	60.76 ± 0.25
	F. s (200) + *N. s* (100)	60.78 ± 0.39	61.02 ± 0.15	60.92 ± 0.11	61.10 ± 0.55
	Distilled water	61.00 ± 0.71	61.26 ± 0.49	60.40 ± 0.55	60.60 ± 0.55

** P>0.05. Variation among columns*

Table 4: Effect of aqueous extracts of *Ficus sycomorus* and *Nigella sativa* and their combination on bleeding and clotting times in rabbits

Parameters	Extract and dose (mg/kg)	Days of treatment			Days post-treatment
		7*	14*	21*	14
Bleeding time (min.)	*F. sycomorus* (200)	1.02 ± 0.50	1.13 ± 0.50	1.10 ± 0.40	1.03 ± 0.63
	N. sativa (100)	1.04 ± 0.40	1.10 ± 0.50	1.10 ± 0.40	1.05 ± 0.65
	F. s (200) + *N. s* (100)	1.01 ± 0.50	1.40 ± 0.50	1.30 ± 0.63	1.36 ± 0.50
	Distilled water	1.99 ± 0.50	2.02 ± 0.29	2.09 ± 0.40	2.10 ± 0.40
Clotting time (min.)	*F. sycomorus* (200)	1.01 ± 0.40	1.05 ± 0.30	1.03 ± 0.40	1.30 ± 0.25
	N. sativa (100)	1.10 ± 0.63	1.10 ± 0.41	1.00 ± 0.41	1.00 ± 0.41
	F. s (200) + *N. s* (100)	1.00 ± 0.40	1.20 ± 0.40	1.10 ± 0.25	1.00 ± 0.40
	Distilled water	1.99 ± 0.40	2.43 ± 0.41	1.88 ± 0.50	1.52 ± 0.50

** P<0.05. Variations among column is significantly lower than the control group (distilled water)*

of the blood vessels or through nervous reflexes by constriction of blood vessels, thus the extract could have acted through one or both of these ways. Sandabe and Bomai (2005) in a similar studies showed that the extract of *F sycomorus* increased bleeding time in rats. The differences in observation could be due to the difference in doses and the specie of the animal used. Therefore it is concluded that the extracts either alone or in combination could not affect the peripheral blood and it is non toxic to liver, kidney and muscles as indicated by the biochemical analyses and there was no apparent advantage in combining the two extracts as far as these parameters are concerned.

ACKNOWLEDGEMENT

We acknowledged the efforts and assistance of Tanko Usman, Bitrus Wampana and Ibrahim Izge for some of the laboratory works and Dr S. S. Sanusi of the Department of Biological Sciences, University of Maiduguri, Maiduguri, Nigeria, for identification of the plant specimen.

REFERENCES

ABDURRHMAN, F. (1992). *Studies of natural products chemistry of Moraceae in African traditional medicine and management of psychiatry in Borno State.* M.Sc. Thesis. University of Maiduguri, Maiduguri, Nigeria. 193 pp.

BOSKABABY, M. H., BATOOL S., PARASTOO, J. and SAHAR, K. (2004). Possible mechanism(s) for relaxant effect of aqueous and macerated extracts from *Nigella sativa* on tracheal chains of guinea pig. *BMC Pharmacology, 4 (3):* 1471 – 1474.

BROWN, B. A. (1976). *Haematology Principles and Procedures.* 2nd Edition. Lea and Febiger. Philadelphia.

BUSH, B. M. (1975). *Veterinary Laboratory Manual.* 1st Edition. William Heinemann medical Books Limited, London.

COLE, E. A. (1980). *Veterinary Clinical Pathology,* 3rd ed. W.B. Saunders Company, Philadelphia.

CIOMS (1985). *International Guiding Principles for Biomedical Research Involving Animals.* Council for International Organizations of Medical Sciences (CIOMS). C/o World Health Organization, 1211, Geneva 27, Switzerland.

GEORGE, L. and LAWRENCES, M. (1961). *Taxonomy of Vascular Plants.* Macmillan Company, New York.

HUTCHINSON, J. and DALZIEL, J. M. (1957). *Flora of West Tropical Africa.* Volume 1. Part 1, Crown Agent for Oversea Government and Administration, Willbank, London.

QUICK, A. J. (1975). The bleeding time as a test of homeostatic function. *American Journal of Clinical Pathology, 64:* 87 – 94.

SANDABE, U. K., ONYEYILI, P. A. and CHIBUZO, G. A. (2002). Effects of prolonged oral administration of aqueous extract of *Ficus sycomorus* L. (Moraceae) stem bark on hematological and some biochemical values in rats. *Sahel Journal of Veterinary Science, 1(1):* 60 – 63.

SANDABE, U. K., ONYEYILI, P. A. and CHIBUZO, G. A. (2003). Sedative and anticonvulsant effects of aqueous extract of *Ficus sycomorus* L. (Moraceae) stem bark in rats. *Veternarski Arhiv, 73(2):* 103 – 110.

SANDABE, U. K., ONYEYILI, P. A. and CHIBUZO, G. A. (2004). Studies on some pharmacological activities of the aqueous extract of *Ficus sycomorus* L. (Moraceae) stem bark in Laboratory animals. *Nigerian Journal of Experimental and Applied Biology, 5(2):* 263 – 268.

SANDABE, U. K. and BOMAI, A. I. (2005). The effects of aqueous extract of *Ficus sycomorus* L (Moraceae) stem bark on bleeding and clotting times in albino rats. Pages 143 – 145. *In: The proceedings of the 42nd Congress of Nigerian Veterinary Medical Association.* November 14-18, 2005.

SANDABE, U. K., ONYEYILI, P. A. and CHIBUZO, G. A. (2006). Phytochemical screening and effect of aqueous extract of *Ficus sycomorus* L.(Moraceae) stem bark on muscular activity in laboratory animals. *Journal of Ethnopharmacology, 104:* 203 - 285.

SCHALM, O. W., JAIN, N. C. and CARROL, E. J. (1975). *Veterinary Haematology.* 3rd Edition. Lea and Febiger. Philadelphia.

SHARAFKHANDY A. (1990). *Ave-Sina, Law in Medicine, Interpreter.* Ministry of Guidance Publication, Teheran.

WHO (1992). *Quality control methods for medicinal plant materials.* World Health Organization, Geneva, pp 58-63

WHO (2000). *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine.* World Health Organization, Geneva.

WOERPEL, R.W. and ROSSKOPT, W. (1984). *Avian Haematology.* Veterinary Clinics of North America. *Small Animal Practice, 14:* 249 – 258.