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Studies on the efficacy of *Spigelia anthelmia* extract as anthelminthic in growing goats

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Target Audience: Animal scientist, livestock farmers, ethno veterinarian, pharmaceutical practitioners.

Abstract

Spigelia anthelmia is an important herbal remedy for worm infestation, neurologic disorder, pericarditis and other diseases of the heart that is continuously being used in traditional medical and homeopathic practices. Aqueous extract of Spigelia anthelmia leaf (AESAL) was administered orally to growing goats to determine its effect on gastrointestinal parasite of growing goats. Eighteen growing goats were randomly allotted to three treatments with each treatment replicated thrice. Goats in treatment served as the control receiving no treatment, those in treatment 2 and 3 were administered with AESAL at a dose of 1.5ml/Kg body weight and 2ml/Kg body weight respectively. The phytochemical content of AESAL was determined using standard analytical procedure. Result revealed that AESAL contained 8.14±0.26 mg/g alkaloids, 145±1.49 mg/g tannin, 19.26±1.25 mg/g Saponin, and 6.7±0.92 mg/g flavonoid and 1.65±0.02 mg/g polyphenol. Round worm and liver fluke are the prevalent helminthes in the study area and the different doses of AESAL significantly (P<0.05) reduced the mean egg count (epg) of helminthes. The study revealed that AESAL is an effective anthelmintic in goats and dosage of 2ml/Kg body weight is the most effective as it resulted in total deparatization at 21 days post treatment.

Keywords: *Spigelia anthelmia*; leaf extract; phytochemical; anthelminthic; growing goats.

Description of Problem

Food security is the physical and economic access to food for all people at all times and it is concerned primarily with food availability, hence lack of food security or its inadequacies ultimately affects the nutritional status and health of individuals (1;2). The low level of animal protein intake by Nigerians and its consequential effect has been reported by various workers (3; 4; 5; 6). The average animal protein intake of Nigerians is less than 10g/head/day (3) which is less than 25% of the updated recommended dietary protein intake of 46-56g per head per day (7; 8). The problem of protein shortage especially that of animal origin is perennial in

Nigeria because consumption of animal protein sources such as meat, egg and fish is often low due to economic, cultural, environmental and religious constraint (9; 10). In order to save the country from the perennial malnutrition and its consequences efforts should be geared toward making available adequate quality animal protein at cheaper and affordable prices within the shortest possible time (11).

Goat meat is one of the major sources of animal protein in Nigeria. Goat is hardy and it is an integral member of almost all rural household in the country. Goat have high reproductive rate due to the relatively short generation and high fecundity when compared to other ruminant species. Intensification of goat production in Nigeria is practically hindered by the prevalence of parasites. Parasites deplete the nutrients available to the host and also inflict mechanical injury on their bodies and internal organs. The prevalence of helminth diseases among ruminants species in Nigeria is very high, especially during the wet season when infection is as high as 100% (12). The high rate of infection prevents livestock from attaining their optimum productivity (13); hence effort should be geared towards controlling these diseases.

Spigelia anthelmia is an annual weed that is widely distributed in the tropics and is extensively used in trado-medical practice as anthelminthic (14; 15). The plant grows luxuriantly on fallow farm land in the forest and savanah zone of Nigeria and it is usually ploughed in during land preparation.

This study therefore evaluated the efficacy of the aqueous extract of *Spigelia anthelmia* as anti-helminthes in growing goat.

Materials and Methods

The plant of *spigelia anthelmia* was harvested from the fallow plots of the crop production and Horticulture department of Lagos state Polytechnic, Ikorodu, Nigeria. The leaves were plucked, weighed, washed and blended in water at the rate of 1kg of the leaves to 1 litre of water using a rotatory blender. The resulting suspension was then filtered through whatman filter paper No. 42 X 170MM and the filtrate (AESAL) was collected and stored in the cold incubator at a temperature of 4^{o}C prior its administration. A portion of the filtrate was concentrated and evaporated in a rotatory evaporator to obtain a powdery residue which was subjected to phytochemical analysis. The qualitative screening was done using standard procedures as described by [(16) (17) (18)], while the tannin content was determined using the methods (19). Total polyphenols was determined by the methods of (20), Saponin Concentration was Determined as described by (21). Flavonoid Concentration was determined by the methods of (22) while the Alkaloid Concentration Determined using the procedure outlined by (18).

The AESAL was administered to eighteen weaned goats of average weight of 5.60±0.23kg in a completely randomized experiment comprising three treatments with each treatment replicated thrice. Goats in Treatment one (T1) serve as the control and were not administered with any anti-helminths, those in treatment two (T2) were

administered with 1.5mls of the AESAL per Kg body weight while those in treatment three (T3) were given 2mls of the AESAL per Kg body weight. The goats were drenched using calibrated drenching gun. The faecal sample was taken before and after the treatment application with the aid of scapula and gloves. The faecal samples were collected directly from the anus of the animal and were taken to the laboratory immediately for analysis. The analysis of the faecal sample was done by the method of formol ether concentration technique as described as follows: 7mls of 10% formol saline was added into a centrifuge tube and 3g of the stool sample was weighed out and added to the tube. The sample was emulsified in the ether and macerated with an applicator stick. The suspension was mixed and sieved with cotton gauze into a conical flask. 3mls of diethyl ether was added into the filtrate and shaken vigorously and pushed back into the centrifuge tube. It was spun at 3000rpm for 3 minutes and the supernatant was discarded after removing the detritus. The deposit in the tube was placed on a slide and covered with a cover slip and examined under the microscope with magnification of X10 and X40 objective after adding a drop of iodine. This identified different eggs of parasites. Each of the faecal samples has a label tagged for identification purpose. The deposit was again used to charge the Neubauer counting chamber and the number of eggs per gram of faeces was estimated. All data collected were analyzed using analysis of variance. The means were separated using Duncan Multiple Range Test. All statistical analysis was done using the Assistat-Statistical Assistance 7.6 beta software developed by (23).

Results and Discussion

The result of the phytochemical analysis as shown in table 1 revealed that the aqueous leaf extract of *S. anthelmia* contained alkaloids, tannin, Saponin, steroid, cardiac glycoside, phlobatanin, flavonoid and phenol. The leaf extract is especially rich in tannin, Saponin, alkaloids, and flavonoid. The values of this phytochemicals are relatively lower than the values reported by (24) probably due to the fact that this study utilizes fresh leaves which the workers utilizes dried leaves. Tannin, Saponin, alkaloids, and flavonoid have been reported to have anthelmintic effect in vitro and in vivo [(14) (15) (24) (26) (27) (28) (29)].

Table 1. Phytochemical screening of aesal

	Chemical Analysis	
Constituents	**Qualitative**	**Quantitative (Mg/g)**
Alkaloids	++	8.14 ± 0.26
Tannin	++	145.5 ± 1.49
Saponin	++	19.26 ± 1.25
Steroid	++	ND
Cardiac glycoside	++	ND
Phlobatanin	++	ND
Flavonoid	++	6.7 ± 0.92
Polyphenol	++	1.65 ± 0.02
Tarpenoid	--	ND

NB: + means Present; - means absent; ND means not determined

The effect of *Spigelia anthelmia* on the number of eggs of the roundworm is depicted in figure 1. Statistical analysis revealed that there were significant difference ($p<0.05$) in the number of eggs of roundworm with respect to the dosage of AESAL. As the dosage is increased the number of eggs per gram of faeces reduces. The highest roundworm egg population (2300) was observed among goats receiving no dewormer at 21 days post treatment while the lowest (0) was observed among goats receiving the AESAL at a dosage of 2mls of the extract. The epg of the feaeces untreated goats increases as the days post treatment increases inferring increases in the population of adult worms that lay the eggs while converse is the case in treated goats where epg was significantly ($P<0.05$) decreased with increasing days post treatment. The fecal egg count reduction were 70.59% and 100% for goats administered 1.5ml/Kg and 2ml/Kg body weight respectively at 21 days post treatment.

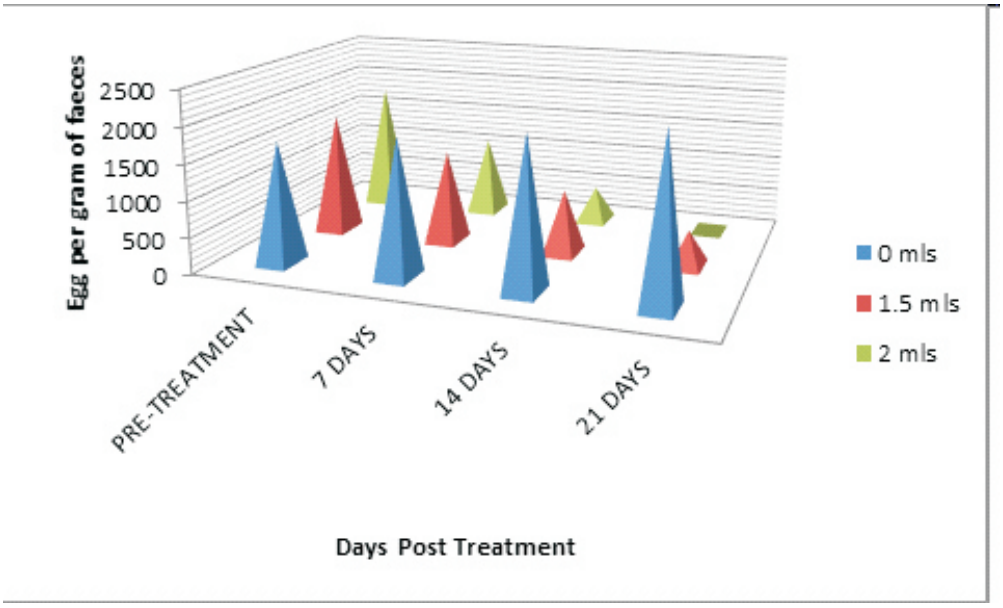

Figure 1: The Effect of *S. anthelmia* on Roundworm in Goats

The effect of the *Spigelia anthelmia* on the number of egg of the liver fluke is depicted in figure 2. The statistical analysis showed that there were significant difference ($p<0.05$) in the number of eggs of liver fluke with respect to the dosage of the AESAL. As the days increase, the number per gram of the faeces reduces, for treated goat while it increases in the untreated goat. The highest liver fluke egg population (1500epg) was observed among the untreated goats at 21 days post-treatment while the lowest (0epg) was observed among the goats receiving dosage of 2mls of the AESAL. The fecal egg count reduction were 80.77% and 100% for goats administered 1.5ml/Kg and 2ml/Kg body weight respectively at 21 days post treatment.

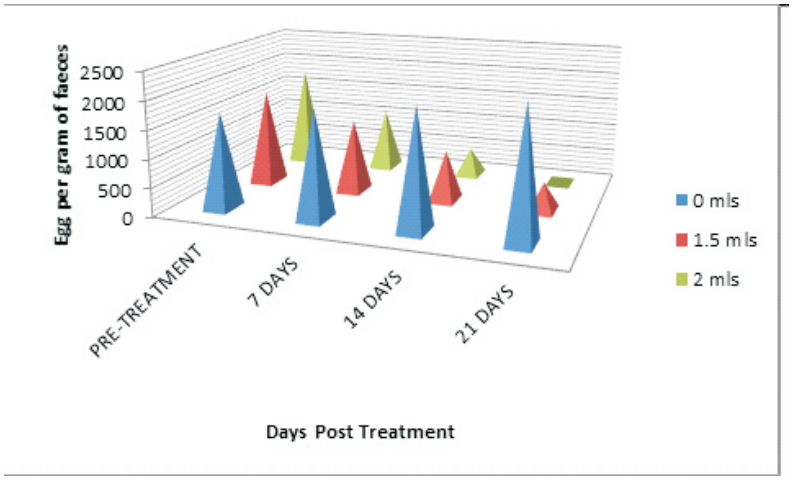

Figure 2: The Effect of *S. Anthelmia* on Liverfluke in Goats

The result of the experiment revealed that the different doses of *spigelia anthelmia* leaf extract significantly (P<0.05) reduced the epg of roundworm and liver fluke in the faeces of the goats. The epg of the two worms reduced at weekly interval after the administration of the extract. The epg of roundworm and liver fluke increased progressively as days post treatment increases in the untreated goats while the epg of both roundworm and live fluke of goats administered AESAL reduces throughout the course of the experiment. At 21 days post treatment, 29.41% and 19.31% of the initial number of eggs of roundworm and liver fluke respectively were detected in the faeces of goats administered 1.5ml/Kg body weight while it was complete absent in the faeces of those on 2mls/Kg weight of the extract, hence, the number of egg count of both the roundworm and liver fluke reduced as the days post treatment increase.

The different doses of AESAL differ significantly (P<0.05) in their effect on the roundworm, and liver fluke of the goats. There appear to be complete deparasitization with respect to roundworm and liver fluke in goats administered with 2mls dosage of the *Spigelia anthelmia* while level deparasitization of the roundworm and liver fluke of goats administered with 1.5ml/Kg body weight in relation to the untreated animals was 78.26% and 83.33% respectively. A deparasitization of 70% has been considered as significant in treatment of parasites (12), therefore AESA is an effective remedy in the control of worms in growing goats.

Conclusions and Applications

The result of the study confirms the following facts:

1. The aqueous leaf extract of *S. anthelmia* contained alkaloids, tannin, Saponin steroid, cardiac glycoside, phlobatanin, flavonoid and phenol.
2. AESA possess pharmaceutical properties that could be harness in controlling livestock diseases.

3. AESA is an effective anthelminthic in growing goats.
4. A dosage of 2mls/Kg body weight was the most effective.

Therefore, AESA can be adopted as a deworming agent by small stock holders and could be package as an herbal remedy by pharmaceutical companies.

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