JOURNAL OF VETERINARY ADVANCES

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J Vet Adv 2014, 4(7): 610-615

DOI: 10.5455/jva.20140713052813

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Global Researchers Journals

Original Article

Antihelminthic and Anticoccidial Effects of *Vernonia Amygdalina* in Goats

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Abstract

The deteriorating and adverse effect of chemoprophylaxis and chemotherapy in livestock production has been well documented, however, not many alternatives with minimal or no side effects are available for treatment and control of parasite infections. *Vernonia amygdalina,* also known as bitter leaf, has been reported to have various medicinal properties, however, its antihelminthic and anticoccidial properties in goats has not been investigated despite anecdotal reports of its antidiarrhoiec effects in the specie. 20 goats were bought from various households, stabilized, divided into treatment group of fifteen and control group of five. They were fed on pasture and allowed to acquire natural parasite infection that was confirmed by feacal count and culture. The treatment groups were fed with *V. amygdalina* leaves and young stalk *ad libitum* for two days while the control group was denied access to the plant. Feacal samples were collected on days 1, 2, 4 and 7, post treatment and sent to laboratory for analysis. The ingestion of *Vernonia amygdalina* was effective in the clearance of helminth eggs and coccidian cysts with an efficacy of 100% for helminths and 99.4% for coccidia. Five goat owners with herds ranging between five to twelve in number diagnosed with helminth infecton were asked to feed *V. amygdalina* leaves to the goats once a week. All the goats were free of helminth infection within the period of four weeks that they were monitored. The effect of *Vernonia amygdalina* on helminth and coccidian parasites in goats has corroborated findings by other authors in other animal species and man. The plant provides an alternative and natural antiparasitic agent for goat heminth and coccidian that is environment friendly and without the effect of chemical residues. Further, studies on the dose may have to be carried out.

Keywords: Antiparasitic, bitter leaf, coccidiosis, eco-friendly, ethnoveterinary, helminthosis.

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Received on: 30 May 2014
Revised on: 17 Jun 2014
Accepted on: 13 Jul 2014
Online Published on: 30 July 2014

Introduction

Parasitism is well known as a limiting factor responsible for losses in health and productivity. These parasites cause disease leading to enormous economic losses through morbidity and mortality in livestock. These losses include mortality, weight loss, low milk output and reproductive failures. This is highly evident in resource poor livestock farmers in tropical Africa and Southeastern Asia (Alawa *et al.,* 2002; Alawa *et al.,* 2010; Bizimenyera *et al.,* 2008). Antiparasitic drugs are agents used to expel parasites from the body of animals and man. Resistance of most parasites to these synthetic drugs has become a major threat to livestock production (Danqueh *et al.,* 2012; Devi *et al.,* 2010). Most of these drugs are of plant origin (Suffness and Douros, 1982) and it is estimated that 80% of the population of Africa depends on plants that have medicinal attributes for their health requirements (Yedjou *et al.,* 2008). Livestock farmers right from the earliest of times have recognized the significance of helminthosis and various methods have been employed by them to control helminths in their animals including the use of medicinal plants and herbs and different grazing techniques (Bukhari and Sanyal, 2011).

Vernonia amygdalina, commonly known as Bitter leaf is a shrub that has been known to be indigenous to a variety of ecological zones in Africa especially sub Sahara Africa (Alawa *et al.,* 2010; Bosch *et al.,* 2005; Danqueh *et al.,* 2012; Farombi and Owoeye, 2011). The various parts of this plant has been reported to have been used as therapeutic agents in different ailments and disease conditions including gastrointestinal problems (Alawa *et al., 2010*; Amin *et al.,* 2009; Farombi and Owoeye, 2011).

Although some work has been done on different species of animals very little is known on the effects of this plant as an antihelminthic and anticoccidial agent in goats. Based on the anecdotal reports of the efficacy of the plant as an antidiarrhoiec agent in goats, we postulated that the observed effect might be against gastrointestinal parasites causing diarrhoea. This work was thus carried out to evaluate the potency of this plant as an anthelminthic and anticoccidial in goats.

Materials and Methods

Plant Collection

The leaves and stalks of *Vernonia amygdalina* were harvested and served fresh to the animals.

Experimental Animals

20 goats approximately nine months of age were bought from various households and kept in the goat house to stabilize. They were allowed to graze freely in the compound and given concentrates as supplement. Mineral licks and water was available *ad libitum*. After two weeks, the animals were divided into a treatment group consisting of fifteen goats and a control group of five goats. Faecal samples were collected and taken to the laboratory to screen for the presence of helminth eggs and larvae and coccidian cysts.

Treatment Protocol

The goats in the treatment group were fed with *V. amygdalina* leaves and stalk *ad libitum* for two days while the control group was denied access to the plant. Faecal samples from all the goats were collected after days 1, 2, 4 and 7. The samples were then sent to the laboratory for analysis.

Fecal Egg / Cyst Count

Faecal samples were collected per rectum from all goats pre and post administration of *V. amygdalina* and subjected to the faecal egg and cyst counts using the Mcmaster method described by Thienpont et al., (1979). The faecal culture, floatation and sedimentation techniques of faecal examination were carried out as described by Khin-Khin *et al.,* (2007). Faecal egg counts, oocyst counts and helminth ova and larvae were recorded.

Percentage efficacy was calculated using the formula modified from that described by Arundel (1985) as follows:

$$\% \text{ Efficacy} = \frac{N - n}{N} \times 100$$

Where:

N = Mean number of helminth egg or cyst in control (untreated) animals.

n = Mean number of helminth egg or cyst in treated animals.

Clinical Trials

Nine goat owners were approached and asked to participate in the feeding trial of V. amygdalina to determine its effect on extensively managed goats. Five with ready access to the plant agreed to participate.

Samples were collected from each goat before the trial and owners were asked to feed their goats with the plant every Tuesday to ensure uniformity. Post-feeding samples were collected every Thursday. All the samples were then taken to the laboratory for laboratory analysis.

Results

No adverse effects were physically observable throughout the duration of treatment. The helminth ova recovered from faecal examination using floatation and sedimentation techniques were *Haemonchus contortus*, *Trichostrongylus spp*, *Ostertagia ostertagi*, *Paraphistomum spp*, *Oesophagostomum spp*, *Charbetia*, *Strongyloides*, and *Moniezia*. However, on faecal culture *Haemonchus contortus*, *Trichostrongylus spp* and *Oesophagostomum spp* were larvae were identified.

Table1: Egg per gram (EPG) values of the treated and control groups pre and post administration of *V. amygdalina*.

	Egg Count				
	Treated Group				
	Pre			Post	
	DAY 0	Day 1	Day 2	Day 4	Day 7
1	150	0	0	0	0
2	300	0	0	0	0
3	250	0	0	0	0
4	850	-	-	-	-
5	200	0	0	0	0
6	250	0	0	0	0
7	50	0	0	0	0
8	200	0	0	0	0
9	450	0	0	0	0
10	250	0	0	0	0
11	800	0	0	0	0
12	200	0	0	0	0
13	200	0	0	0	0
14	2500	0	0	0	0
15	550	0	0	0	0
Control Group					
	1	100	250	350	400
	2	600	950	1150	1200
	3	1000	1550	1600	1850
	4	-	-	-	-
	5	200	650	800	950

Table 2: Coccidia cyst values of the treated and control groups pre and post administration of *V. amygdalina*

	Cyst Count				
	Treated Group				
	Pre			Post	
	DAY 0	Day 1	Day 2	Day 4	Day 7
1	352	0	0	0	0
2	483	0	0	0	0
3	312	0	0	0	0
4	155	0	0	0	0
5	555	0	0	0	0
6	312	0	0	0	0
7	401	0	0	0	0
8	801	0	0	0	0
9	705	0	0	0	0
10	401	7	9	10	12
11	431	0	0	0	0
12	712	0	0	0	0
13	307	1	2	4	5
14	33	0	0	0	0
15	312	0	0	0	0
Control Group					
1	607	801	956	998	1221
2	251	311	409	471	611
3	170	111	122	135	167
4	-	-	-	-	-
5	121	192	234	347	574

The egg per gram (EPG) values of the treated group before administration of *V. amygdalina* ranged from 50 to 2500 while that of the control group ranged between 100 and 1000 (Table 1). The coccidia cyst values were between 33 and 801 pre-treatment in the treated group and 121 to 607 in the control (Table 2). All goats in treated group recorded 0 EPG post administration while the count in control group was on the increase (Table 1). The coccidial count was 0 except in two animals that had cyst counts of 7 from 401 and 1 from 307, 24 hours post treatment. In the control group increase in coccidial count was recorded except for one goat where the count decreased (Table 2).

The percentage efficacy as calculated from the formula above was 100% against helminths and 99.4% against coccidian cysts. Goat 4 in the treated group died before the post administration data could be collected. The death however was not due to the treatment they were undergoing at the time. Goat 4 in the control group died just as the animals were divided into groups before the experiment started at all.

All the goat owners reported that the goats accepted the plant and no adverse reaction were observed. One owner reported that the goats' body condition seemed to have improved during the one-month trial period.

All the goats were diagnosed with helminth infection, which were, *Trichostrongylus*, *Haemonchus*, and *Oesophagostomum* in order of abundance. From the first week of administration all the goats were free of helminth infection and they remained free throughout the trial period of one month. This result was communicated to the owners.

Discussion

This trial was carried out to evaluate the efficacy of *V.amygdalina* in the treatment of helminth and coccidial infections in goats.

The result obtained showed that the plant *V.amygdalina* has antihelminthic and anticoccidal effects in goats. Studies on the anthelminthic effects carried out by other researchers with different

outcomes include Alawa *et al.,* (2003, 2010) and Danquah *et al.,* (2012). Alawa *et al.,* (2010) reported about 59.5% activity of *V.amgdalina* against helminths in cattle while Danquah *et al.,* (2012) showed *V.amgydalina* antihelminthic activity against earthworm. Farombi and Owoeye (2011) also cited that the shrub has been used in the treatment of various helminth diseases. It has also been suspected that the plant was part of the plants that relieved an apparently ill chimpanzee of its illness (Huffman, 2003). It was however observed that literature on the effect of this plant on gastrointestinal helminths in goats is limited hence this report on the effect of *V. amgydalina* as an anthelminthic agent in goats.

The efficacy of this plant as an antihelminthic in goats (100%) is higher than that reported by Alawa *et al.,* (2010) which reported 59.5% in cattle. Alawa *et al.,* (2010) administered aqueous extract of the plant to the cattle while in this experiment we fed whole leaves and young stalks of the plant to the goats. This could probably account for the higher efficacy reported in this experiment as compared to that of Alawa *et al.,* (2010). It could also be due to other factors that need to be considered such as genetic and physiological conditions.

Various reports on the effects of the plant as an anticoccidial agent in other species exists even in Nigeria (Mohammed and Zakariya´ u, 2012; Oyagbemi and Adejinmi, 2012) but there has been no report on the coccidial species in goats. This experiment reported an efficacy of 99.4% as an anticoccidial agent in goats. This is higher than that reported by Al-fifi (2007) who reported efficacies of 35% in free-range chickens. The difference in species could account for the variation in results. The ease of acceptance by goat owners also makes the use of the plant ideal as well as the fact that the plant is widely available since it is eaten as vegetable by a lot of people and often planted in backyard gardens (Agbogidi and Akpomorine, 2013). The fact that a once a week feeding was sufficient to keep the goats helminth free is an indication of its efficacy as anthelmintic for animals kept traditionally under the free range extensive management, which is the most commonly practiced system of goat keeping in Nigeria (Ajala *et al.,* 2008; Lawal-Adebowale 2012). The result of this trial shows that the plant, *V. amgydalina,* has antihelminthic and anticoccidial activities in goats. Its use will ease the economic burden of antihelminthic and anticoccidial chemotherapy; also, for the small livestock farmers the plant will serve as a cheap means of controlling coccidial and helminth parasites especially in young goats that are exposed to stress. The pressure of drug use and its adverse effect of development of drug resistance can also be ameliorated by the use of this plant in goats. According to MacDonald *et. al.*, (2002) owing to the control of insect vector populations, the safe disposal of human excrement, and the availability of efficacious drugs, helminth parasites have been largely eradicated as a public health concern in developed countries. Unfortunately, however, in developing countries, where these types of control measures are often not yet practical, helminths remain a significant biomedical problem. One consequence of this geopolitical segregation is that most of the world's pharmaceutical industries do not support active research and development programs on helminth parasites that cause human disease. The financial burden of scientific advancement in this area of research is therefore carried primarily by philanthropic and government-funding agencies. This situation described by MacDonald *et al*., (2002) is quite applicable to helminth infection of livestock thus; the availability of a natural, cheap and effective alternative such as *Vernornia amygdalina* is of great importance and must be further explored.

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