Comparative effectiveness of Aloe vera aqueous crude extracts and ivermectin for treatment of gastrointestinal nematodes infection in goats

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SUMMARY

The current study was undertaken to determine the effectiveness of Aloe vera aqueous crude extracts in comparison to Ivermectin in treatment of gastrointestinal nematodes infections in goats at Sokoine University of Agriculture in Morogoro. Goats were examined for GIT nematode infections using modified Mc master technique and those with EPG ≥ 150 were recruited for this trial. Furthermore, the recruited animals were randomly allocated into three groups (@10 animals) that included one control group and two experimental groups. The control group was left untreated while the remaining experimental groups were treated with Aloe Vera aqueous crude extracts and Ivermectin respectively. Faecal samples were collected at day of treatment (day 0) and days 14 and 21 post treatment. The effectiveness of the Aloe Vera and Ivermectin was assessed using Feacal Egg Count Reduction Test (FERT). The anthelmintic was considered to be effective when the calculated FECRT% was ≥ 95% and 95% Lower Confidence Limit (LCL) was ≥ 90%. The day 14 post treatment results of FERT% and LCL for Aloe vera were 97% and 74% while for Ivermectin were 96% and 69% respectively. However, the FERT% and LCL results at day 21 post treatment were 100% for both products. The findings of this study indicate that Aloe vera aqueous crude extracts were effective as Ivermectin in treatment of GIT nematodes infections in goats.

Keywords: Aloe vera, Ivermectin, GIT nematodes, Goats

INTRODUCTION

Gastrointestinal nematodes are responsible for causing huge economic losses in goat productivity worldwide. The GIT nematode parasites that have been reported to infect goat in Tanzania include; *Haemonchus contortus*, *Trichostrongylus* spp, *Oesphagostomum* spp (Connor *et al.*, 1990, Keyyu *et al.*, 2002). *Haemonchus controtus* is ranked as the major constraint to goat productivity in Tanzania (Connor *et al.*, 1990). Control of helminthes infections in domesticated ruminants in the country; largely depend on prophylactic or therapeutic use of broad spectrum anthelmintics (Keyyu *et al.*, 2008). The most commonly used anthelmintics for control of GIT nematode infections in goats by farmers in Tanzania include benzimidazoles (Albendazole), macrocyclic lactones (Ivermectin and imidazothiazoles (levamisole).

The use of anthelmintics as a major means of controlling GIT nematode infections in small ruminants is threatened by development of anthelmintic resistance worldwide (Kaplan 2004; Wolstenholme *et al.*, 2004) including Tanzania where albendazole resistant to *H. contortus* in sheep has been reported (Keyyu *et al.*, 2002). The development of anthelmintic resistance necessitates the searching of new effective alternatives against GIT nematodes (Amhed *et al.*, 2013) and traditional medicinal plants are considered as one of the most promising alternatives (Maphosa *et al.*, 2010).

Worldwide, there are several medicinal plants including Aloe vera are tested for their anthelmintic activity (Eguale *et al.*, 2007). In vitro studies on the anthelmintic activity of aloe vera extracts to the GIT nematode infections in sheep and goats have been reported elsewhere in the world (Maphosa *et al.*, 2010, Ahmed *et al.*, 2013). The later studies indicated that aloe vera extracts had larvicidal and egg hatching inhibition effects for *H. controtus* and the authors recommended for invivo studies on the efficacy of the plant. This study was designed to determine the effectiveness of the aloe vera aqueous extracts on treatment of GIT nematode infections in goats compared to ivermectin as a positive control.

MATERIALS AND METHODS

Preparation of aqueous aloe vera extracts

A crude extract was prepared as described by Kaingu *et al.* (2013) whereby fresh aloe vera leaves were chopped using machete and placed in a rotary blender and blended to slurry. The slurry was then squeezed to give out the crude extract viscous juice which was placed in the glass bottles and stored in a refrigerator.

Experimental design

An experimental study design was adopted in this study. In order to get animals that were used in the selection of groups, all goats at Sokoine University Farms were screened for GIT nematode infections using quantitative floatation method (Modified Mc Master technique). The goats with EPG ≥150 were randomly selected and divided into three groups (control group, aloe vera group and ivermectin group) of 15 animals each.

The control group was left untreated and the remaining two groups were treated with aloe vera aqueous extracts and ivermectin respectively. The concentration of the amount of aloe vera aqueous that was administered to the goats was not established but goats were drenched 5 mls of the prepared extracts. The ivermectin was administered subcutaneously at dosage of 0.2 mg/kg body weight.

Data collection and processing

Faecal samples from each group were collected at day of treatment (day 0) and at days 14 and 21 post-treatment). Collection of samples was per rectum using gloved hand fingers that followed by labeling the samples with permanent maker and eventually the samples were kept in cool and then transported to laboratory for further analysis. In the laboratory the samples were processed by Modified Mc Master method and recovered eggs were examined and counted under compound light microscope so as to establish faecal egg counts for each sample. Identification of eggs aided by using standard morphological keys of GIT nematode eggs of goat (Bowman, 2009). Pre-treatment (day 0) and post-treatment (days 14 and 21) faecal samples were pooled for each group and faecal culture, harvesting and identification of larvae was performed as described by Hansen and Perry (1994).

Data analysis

The analysis of the data was conducted using Faecal Egg Count Reduction Test (FECRT %) as described by Coles *et al*., (1992). In this analysis the post-treatment faecal egg counts of treated groups are compared with that of the control group to compute the percentage reduction of faecal egg counts. The anthelmintic considered to be effective when the percentage reduction is ≥ 95% and 95% Lower Confidence Limit is ≥ 90%.

RESULTS AND DISCUSSION

The pre-treatment faecal culture results indicated that goats at Sokoine University Farms were infected with the following species of GIT nematodes: *Haemonchus contortus* (48.4%), *Trichostrongylus* (21.2%), *Cooperia* (14.8%) species, *Oesophagostomum* (14.4%) and *Strongyloides* (1.2%). Similar results have been recorded in the previous studies at SUA farms by Keyyu et al. (2002, 2003).

This study has indicated that aloe vera aqueous leaves extracts was effective as ivermectin in treatment of GIT nematode infections in goats, as the calculated FECRT% at day 21 was > 95% and 95% LCL was > 90% (Table 1). These findings concur with the previous in vitro studies that reported aloe vera extracts were effective against *Haemonchus contortus* (Maphosa *et al*., 2010, Ahmedi *et al.,* 2012) and *Ascaridia galli* (Kaingu *et al.,* 2012).

Table 1: FECRT% and 95% LCL for aloe vera and ivermectin

Treatment group	Days post treatment	FECRT%	95% LCL
Aloe vera	14	97	74
	21	100	100
Ivermectin	14	96	69
	21	100	100

Moreover, the current study has indicated that ivermectin is still effective for treatment of GIT nematodes infections in goats at SUA Farms. These results agree with previous study at SUA farms indicated that ivermectin was effective against GIT nematode infections in sheep and goats (Keyyu *et al*., 2003). However, GIT nematodes resistance to ivermectin in domesticated ruminants has been reported elsewhere in the world (Geurden *et al.,* 2015). This study clearly indicates that aloe vera aqeous crude extracts had good effects on GIT nematode infections as ivermectin. However, more studies are recommended to evaluate the efficacy of the aloe vera, before it recommended for use to the farmers.

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