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ORIGINAL ARTICLE

Short-Term Preliminary Anthelmintic Effect of *Sesbania grandiflora* in Naturally Parasitic Infected Goats with Side Effects Observation

L. M. Azrul[1,2], K. Poungpong[2], S. Jittapalapong[3] and S. Prasanpanich[*2]

[1]Animal Husbandry Laboratory, School of Food Science and Technology, Universiti Malaysia Terengganu, 21030, Kuala Terengganu, Terengganu, Malaysia.
[2]Department of Animal Science, Faculty of Agriculture; [3]Department of Parasitology, Faculty of Veterinary Medicine, Kasetsart University, Bangkhen Campus, 10900 Bangkok, Thailand.

[*]Corresponding Author:

S. Prasanpanich

Email: agrskp@ku.ac.th

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Abstract

This study was conducted within short-term period to determine the preliminary anthelmintic effect of *Sesbania grandiflora* leaves on gastrointestinal parasites infection in goats. Anthelmintic effect was determined by observing the trend of helminth eggs from day-0 to day-14 and followed by another 14 days until day 28 for post-treatment period. A total of 18 male goats were equally divided into three groups; group 1 was left untreated as a control, group 2 was treated with fresh leaves and group 3 was treated with dried leaves of *S. grandiflora*. Fecal samples were freshly collected weekly and fecal egg count was done. Lethality was recorded once happen and clinical observation on any abnormalities and physiological aspects was observed daily. Reduction of nematode eggs for group 2 and group 3 were 42% and 40% after 14 days respectively. Reduction at day-28 for group 2 and group 3 were 47% and 43% respectively. There was no lethality occurred and abnormalities observed on the physiological aspects of the goats to indicate side effects of the plant to the host following administration of *S. grandiflora*. Thus, this tropical legume plant was determined to have anthelmintic effect with no side effects to the animal host.

Keywords: Anthelmintic effect, Gastrointestinal parasites, *Sesbania grandiflora*, Short-term period, Side effects.

1. Introduction

Goat is one of the important animal in livestock industry worldwide (Waller, 1997). However, a range of diseases become a major problem that can affect goats' production (Sani and Gray, 2004; Sharma *et al*., 2014). Gastrointestinal parasites infection is globally known as significant risk for this industry. Health status of the animal host was affected due to the pathological effects such as anaemia (Maiti *et al*., 1999; Khan and Kishor, 2014a) and impaired on nutrient absorption (Sykes, 1994; Hoste, 2001). Sani and Gray (2004) had summarized the parasites species found in ruminants in Southeast Asia region. There are *Haemonchus contortus* and *Trichostrongylus* spp. with huge percentage and other species are also detected with small percentage; namely *Oesophagostomum* spp., *Moniezia* spp., *Trichuris* spp., *Cooperia* spp. and *Fasciola* spp. A report by McLeod (2004) has been discussed about the economic losses evaluation for Southeast Asia countries and stated that in 1999, the most affected country is Indonesia followed by Philippines, Malaysia, Vietnam and Thailand.

Conventional method for gastrointestinal nematode infection is using anthelmintic drugs such as closantel, oxfendazole and ivermectin (Wahab, 2003). However, according to Hammond *et al*. (1997), these anthelmintic drugs are reported to have some disadvantages. Local farmers in developing countries were not able to buy all classes of the drugs. Thus, farmers are only able to buy limited drugs and kept repeating used it without simultaneously administered the drugs according to the right procedure. Many species of worms were successfully developed the resistance in their gene allele due to the repeatable usage of drugs (Hammond *et al*., 1997; Waller, 2003).

Based on this resistance phenomenon, local plant could offer an alternative (Fajmi and Taiwo, 2005; Githiori *et al*., 2006; Noon, 2003; Radhakrishnan *et al*., 2007; Khan and Kishor, 2014b). The use of plant

as anthelmintic is both sustainable and environmentally acceptable (Hammond *et al.,* 1997). Traditional practices using local plants that believe containing anthelmintic properties become the reference for scientific evaluation (Joy *et al*., 1998; Hoste *et al.*, 2008). Currently, there is increasing interest in the exploration of potential local plants or their products for helminths control in small ruminants (Hammond *et al*., 1997). In tropical countries, there are variety of local plants which successfully tested for their efficacy in controlling parasitic infection for ruminant such as cassava and neem (Chandrawathani *et al*., 2002, 2006; Nurulaini *et al.*, 2007; Radhakrishnan *et al*., 2007).

Previous reports stated that *Sesbania grandiflora* have anthelmintic properties (Fojas *et al*., 1982; Gutteridge and Shelton, 1997). This plant which commonly known as Agati or Hummingbird tree is belonging to the Leguminosae family and native to tropical region with widespread distribution in Southeast Asia and India region. Thus, the objective of this preliminary study was to scientifically determine the anthelmintic potential of *S. grandiflora* leaves in short-term daily-feeding trial with side effects observation.

2. Materials and Methods

2.1 Plant Collection and Preparation

Two forms of *S. grandiflora* leaves were used in this study; fresh and dried. Leaves were collected around Kuala Terengganu area (05°20'N, 103°08'E). Leaves samples were identified by staff of Department of Biological Sciences, Universiti Malaysia Terengganu. For dried samples preparation, leaves were air-dried under shades at a well-ventilated place and prepared before the trial started. Meanwhile, for fresh leaves, it can be used directly after collection.

2.2 Experimental Animal

Experimental animals used in this study were Katjang goats breed. Goats with natural infection of gastrointestinal nematodes were chose from local farm. Eighteen male goats, 4-6 months of age, and weighing approximately 10 kg were equally divided into three groups (n=6 goats per group). Once the goats were bringing up to the animals house, they were let free for acclimatization at least a week before the trial started.

2.3 Experimental Design

Before the trial started, fecal samples were freshly collected from all goats and fecal egg count (FEC) was conducted to obtain the mean number of egg per gram (EPG) from all groups at initial. Then, from day-1 until day-14, goats from group 2 and group 3 were treated with fresh and dried *S. grandiflora* leaves respectively. Meanwhile for group 1, there were left untreated. Leaves were provided *ad libitum* and supplemented with manufacturing concentrate. Control group was only administered with concentrate. After 14-days trial, only concentrate pellet was given to all groups for another 14 days. This second phase of trial without any treatment was arranged to observe any delayed side effects symptoms. Water was provided to all goats *ad libitum* for the whole period.

2.4 Parasitological Analysis

Fecal samples were freshly collected from goat's rectum weekly. This fecal sampling was done for each animal in the morning and was continued for four weeks. These samples were subjected to the modified McMaster fecal egg count method, using 3 g individual fecal samples (Christopher *et al*., 1992).

2.5 Side Effects Observation

Lethality occurrence for each animal was observed following daily treatment and within post-treatment. Physiological aspects were observed daily for the whole period as described by previous studies (Levine, 1995; Evans, 1996; OECD, 2001; Chin *et al*., 2008). Any changes or abnormalities on their physiological characteristics were recorded.

2.6 Statistical Analysis

Fecal egg count (FEC) values during the experimental period were analyzed using ANOVA one-way. Clinical observation was expressed in descriptive analysis.

3. Results

For short-term preliminary test, *S. grandiflora* offered limited effect on reduction of helminth eggs. The reduction percentage after 14 days is 42% and 40% for both treatment groups; group 2 and 3. Meanwhile after post-treatment period, reduction is recorded at 47% and 43% respectively. Mean of egg reduction was showed in Fig 1. For clinical observation, no lethality and abnormalities were observed to indicate any side effects following administration of *S. grandiflora* leaves within both treatment and post-treatment period as described in Table 1.

4. Discussion

From Fig 1, percentage of reduction for number of gastrointestinal parasite eggs can be obtained by comparing the pre and post values. Reduction trend can be observed for two phases; the first one is after 14 -

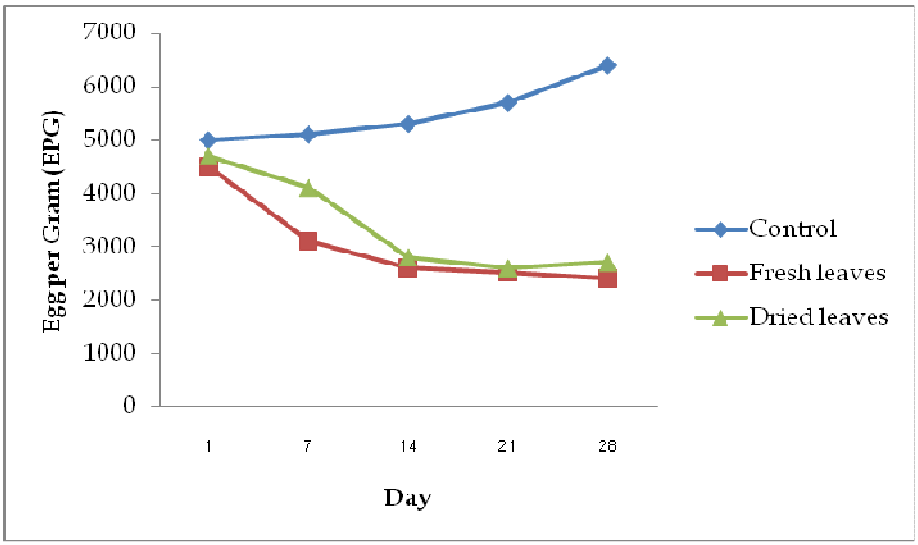

Fig 1: Mean of fecal egg count; egg per gram (epg) for treatment and control group

days treatment period and second phase is summary of the reduction after post-treatment period on day-28. For goats treated with fresh leaves, reduction percentage after 14 days was 42% and for group treated with dried leaves was 40%. After 14 days post-treatment period, the summary of egg reduction for both groups was slightly same (P>0.05). The percentage of reduction of the group treated with fresh leaves was slightly higher than the group treated with dried leaves. However, there is no significant difference among these two treated groups ($P > 0.05$). Significant different can be seen when treatment groups compared with control (P<0.05).

Table 1: Daily note of clinical observation for physiological aspects of the goats

Physiological Aspect	Clinical Observation
Movement in cage	Still active in cage
Skin and fur color	No color exchange and no sudden hair fall
Mucosa at eyes	No mucosa
Mucosa at nose	No mucosa
Bleeding	No bleeding
Salivation	No bad salivation
Convulsions	No convulsions
Tremors action	No tremors action
Diarrhea	No diarrhea
Coma	No coma

In this preliminary study, it's reported that both groups treated with fresh and dried *S. grandiflora* leaves respectively could not reduced the eggs up to 50%. When compared to previous studies using variety of plants, many of them are successfully reduced the parasites eggs more than 50% and some of them even can achieve 90% reduction. This limited effect might be happened due to the short experimental period. However this 14 days feeding trial was already gave more than 30% egg reduction. From previous reports, it's found that plant secondary metabolites (PSM) such as tannins, alkaloids, glycosides and terpenes are involved in the anthelmintic properties that responsible to the anthelmintic potential of various plants (Hoste *et al*., 2008).

There are ranges of previous studies focusing on detection of tannins in *S. grandiflora* (Wagh, 2009; Bahera *et al*., 2012; Renji and Alphonse, 2013). It's proven that they have found similar results which *S. grandiflora* contain tannins. In this short-term preliminary study, both groups treated with fresh and dried *S. grandiflora* leaves showed reduction of helminth eggs more than 30% respectively. As concerned, the reduction values could achieve up to 60% until 80% if the feeding trial conducted longer in the future as compared with previous studies.

5. Conclusion

According to the results observed in this short-term preliminary study, it can be concluded that *S. grandiflora* leaves are proven to have anthelmintic efficacy against parasites infection in goats. Both fresh and dried leaves have a potential to be use as a natural anthelmintic and can be widely promoted to the local farmers. Future works are needed to be conducted with extension of the feeding period and determination of the effective dosage.

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