Effect of *Jatropha curcas* Latex on L3 *Haemonchus contortus* Larval Motility

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**ABSTRACT**

The anthelmintic resistance has limited the control of gastrointestinal nematodes of small ruminants and thus has awakened interest in the study of plants extract as a source of anthelmintics. These experiments were carried out to evaluate the in vitro efficacy of *Jatrophacurcas* latex extract against *Haemonchuscontortus* larval motility. To evaluate the larvicidal activity, *H.contortus* L3 were incubated with the extracts with varying concentration of 5 mg/mL, 10 mg/mL, 15 mg/mL and 20 mg/mL at 27°C for 48, 72 and 96 hrs. The results were subjected to the Kruskal-Wallis test (P<0.05). The extracts showed dose-dependent larvicidal effects. These results suggest that *J.curcas* can be used to control gastrointestinal nematodes of small ruminants.

**Keywords:** Anthelmintics, *Jatropha curcas*, *Haemonchus contortus*, Larval motility and Larvicidal effects.

**INTRODUCTION**

Gastrointestinal parasitism was considered to be a multifaceted disease that causes decline of profitable livestock production especially among sheep and goats all over the world. They infect all types of livestock but depending on various factors like severity, host range and life cycle. Nematodiases causes 28% of mortality in small stock and weight loss of about 3-8% in livestock, causing US$ 2 billion wastage per annum in many countries. Among various intestinal parasites, *Haemonchus contortus* is one of the most significant and accountable parasite causing acute and sub-acute parasitic gastroenteritis of small ruminants. In Malaysia predominantly Sabah, high-level stock losses from the farm were recorded for several years. As frequently accompanied by clinical signs indicating pathogenic levels of infections with the nematode parasite *H.contortus*. The pathogenicity of these parasites is due to its obtained nutrition and shelter from animal host, which results in poor growth rate, reduced fertility, less immunity, damaged gastric function, high mortality and increased costs of management. These parasites are controlled by the administration of synthetic anthelmintics. However, in many countries, the indiscriminate use of anthelmintic has resulted in the establishment of parasite resistance. Evidence from various sources also indicated the severity of multiple anthelmintic resistances that reached extremity. Therefore, the plant phytochemicals, or plant extracts, have become increasingly attractive as an alternative vector control agents. They show small or no harmful effects on non-target organisms and the environment.

Bioactive plants, an alternative for the control of gastrointestinal nematodes, are rich in secondary metabolites. Previous researches have emphasized the importance of certain plant extract as a source of anthelmintic. However, development of herbal substances in terms of controlling parasites may vary in their results, but are effective and compatible with human and animal life. *J.curcas* is commonly known as physic nut or purging nut and it belongs to Euphorbiaceae family. The plant is found in tropical regions of Africa, South America, South East Asia and India. *J.curcas* is considered as a large shrub or a small perennial tree because of its 5 m height, but under several conditions their height can also reach up to 8 or 10 m. The plant has soft wood with subtle grey bark and when cut the bark, produces white and milky latex. The sap (latex) and crushed leaves of *J.curcas* have shown anti-parasitic activity. In addition to its use as anthelmintic, most plant parts are used for the treatment of various human and veterinary ailments. Phytochemical screening of *J.curcas* leaves and bark extract revealed the presence of alkaloids, flavonoids and steroids and these compounds are known to possess insecticidal and larvicidal properties. Root and stem extract of *J.curcas* plant has been demonstrated to possess pesticidal and insecticidal effects. Petroleum ether extracts of *J.curcas* plant contains antibacterial compounds against *Staphylococcus aureus*. Up to our knowledge, there are no reports on *J.curcas* plant study against *H.contortus* parasites in Malaysia. Thus, the main purpose of this study is to determine the efficacy of

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Jatropha curcas latex at different concentrations which prevents the larval motility of L3, H.contortus.

MATERIALS AND METHODS
This research is aiming at evaluating the anthelmintic potential of J.curcas by incubating the L3 H.contortus with J.curcas latex at different concentrations.

Preparation of Jatropha curcas latex
The latex was collected from the bark of the plant. The collected latex was centrifuged at 10,000 rpm for 10 mins to remove the unnecessary sedimentation. Then, the latex was dried by incubating them at 45-50°C for 2 days. The dried latex was weighed to estimate the yield.

Larval culture
From the rectum of naturally exposed goats, faecal sample were collected to make a positive samples for copro-culture which was needed for the procurement of third stage larvae (L3)

Table 1: In vitro anthelmintic activity of J.curcas latex extract on L3 H.contortus.

<table>
<thead>
<tr>
<th>Conc. (mg/mL) / Incubation time (hours)</th>
<th>Jatropha curcas (mg/mL)</th>
<th>Larval motility inhibition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>48</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>72</td>
<td>5</td>
<td>22.73</td>
</tr>
<tr>
<td>96</td>
<td>50</td>
<td>58.82</td>
</tr>
</tbody>
</table>

Mean percentage of larval motility inhibition (%) at different concentration of J.curcas latex extract on L3 H.contortus in vitro test to evaluate the inhibition of larval motility has been widely used in veterinary parasitology to the prospecting of novel anthelmintic agents. The infective L3 larvae stage of the nematode species was chosen in this experiment, because it is the infective stage that causes the disease. Several investigators reported on the performance of medicinal plants extracts against the treatment of haemonchosis in goat. In vitro anthelmintic activity of J.curcas latex extract to inhibit L3 of H.contortus larval motility was performed by experiment.

RESULTS AND DISCUSSION
Present study was done to analyze the efficiency of Jatropha curcas (J.curcas) latex extract against haemonchosis in goat. The results showed that the latex extract of Jatropha curcas have anthelmintic properties against L3 H.contortus. Table 1 showed the larval motility inhibition (%) of Jatropha curcas bark extract at various concentration against L3 H.contortus. From the Table 1, it was shown that the latex extract of J.curcas at concentration of 5mg/mL, 10mg/mL, 15mg/mL and 20mg/mL and 25mg/mL were used to assess the anthelmintic performance of the plant. Several investigators reported on the performance of medicinal plants extracts against the treatment of haemonchosis. In vitro test to evaluate the inhibition of larval motility has been widely used in veterinary parasitology to the prospecting of novel anthelmintic agents. The infective L3 larvae stage of the nematode species was chosen in this experiment.
research as they have high capacity to survive even in adverse conditions. Moreover, larvae stages are the feeding stages, and therefore they could even ingest or absorb medicinal components, thus make it more feasible in this research. The advantage of the assay is that compounds or materials to be tested are in direct contact with the infective life-cycle stage of the parasite. Most studies have been conducted on many other parasites with *J. curcas* plant extract. In this study, the efficacy was varied with the extract concentrations and compared with the negative control, distilled water and positive control, Albendazole. The larvae were incubated for 48, 72 and 96 hrs and the results were shown in Fig 1.

At 48 hours of incubation, the latex extract of *J. curcas* at concentration of 5mg/ml, 10mg/ml, 15mg/ml, 20mg/ml and 25mg/ml inhibited the motility of L3 by 0%, 0%, 4.76%, 17.39% and 66.67% respectively. At 72 hours of incubation, the latex extract of *J. curcas* at concentration of 5mg/ml, 10mg/ml, 15mg/ml, 20mg/ml and 25mg/ml inhibited the motility of L3 by 5%, 22.73%, 23.81%, 50% and 55% respectively. Finally, at 96 hours, the motility of the L3 were observed to be much slower and the latex extract of *J. curcas* at concentration of 5mg/ml, 10mg/ml, 15mg/ml, 20mg/ml and 25mg/ml inhibited the motility of L3 by 50.00%, 58.82%, 57.14%, 66.67% and 70.59% respectively. The positive control and negative control had no significant effect on the larval motility inhibition. The larvae were moving actively as usual in both the controls. Unlike positive control albendazole, the latex extract of *J. curcas* at 15mg/ml, 20mg/ml and 25mg/ml had shown increasing reductions in larval motility of L3 *H. contortus* accordingly. Through observation, the movements of the larvae were also much slower and less active after incubated with *J. curcas* latex as compared to positive control. Based on the observation done, as the incubation time and concentration of *J. curcas* latex increases, the motility of the L3 larvae seem to be much slower. It was also observed that the larvae were started to prolong coiling themselves during this interval.

According to Siamba and Namasaka, (2008), a physical change manifested as coiling is associated with the larvae response to gradual external stress. It was considered as a survival strategy aimed at conserving energy (lipid reserves) and protecting the parasite against molecular damage and ensuring survival long enough beyond the span of the stressful period. As compared to previous research, positive results were also found on L3 of *H. contortus* with the methanolic extracts of *A. indica* and *A. roburghiana*. Molefe et al. (2012) have obtained positive result on L3 of gastrointestinal nematodes with *A. africana* and *Mentha longiflora* extracts. Akter et al. (2014) also achieved the same positive results on L3 of *H. contortus* with medicinal plants named neem, tamak, korolla, halud, chatim, sharna lata and lazzabati. The result of the plant extract showed dose-dependent larvicidal effects on *H. contortus*. Therefore, suggesting that *J. curcas* can be used to control gastrointestinal nematodes of small ruminant.

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CONFLICT OF INTEREST

None declared.

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