

Anthelmintic Activity of Ethanolic Extract of *Syzygium samarangense* (Blume) Merril & Perry.

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Medicinal plants have therapeutic values for various ailments.¹ Generally rural people prefer medicinal plants than synthetic drugs for the treatment of various diseases rather than urban areas.² Considerable potential offered by medicinal plants is helpful for the upgradation of new and effective agents against various diseases which are currently difficult to diagnose and treat.³ By isolating new compounds, their biological effectiveness is measured which could serve them as good candidates for future drug development.⁴ Today modern collaborative efforts have involved investigating the pharmacological properties of plants that can include anthropologists, pharmacists, pharmaceutical chemists and physicians.

Syzygium samarangense (Myrtaceae) is a tropical tree growing almost 12 m tall that is distributed throughout Bangladesh, Philippines, India, Indonesia and Malaysia. It is locally known as Jamrul. *Syzygium* species are known to be useful in dysentery, amenorrhea, diabetes, cough, headaches, and fever. A compound named vescalagin, which was isolated from fruits of *S. samarangens*, showed hypoglycaemic activity.⁵ The fruits also showed tumor necrosis and antidiarrheal activities.⁶⁻⁸

The leaf extract of *S. samarangense* revealed immunomodulatory, analgesic and anti-inflammatory and anti-hyperglycemic effects.⁹⁻¹² According to folk medicine the astringent bark is used as mouthwash, abortifacient as well as in diarrhea, helminthiasis etc.¹³ Our investigation was run to evaluate the anthelmintic activities of ethanolic extract of bark of *S. samarangense* (Myrtaceae).

The bark of *S. samarangense* was collected from Daulatpur, Bangladesh in November, 2012 and identification was done by Bangladesh National Herbarium. It has been preserved as a voucher specimen with the accession No. DACB- 38621.

First the collected fresh barks of *S. samarangense* were washed with water and then small pieces were made. Air drying system was followed for about 10 days and pulverized into powder (200 gm) which was macerated in 900 ml pure ethanol for 7 days at room temperature (23 ± 5) °C. Cotton plug and a Whatman No.1 filter paper were used to filter the extract within 7 days. The filtrate was placed under a ceiling fan and on a water bath for proper evaporation until dried. After drying, dry adhesive mass was obtained. Finally, the extract (19.28 gm, 9.64% of yield) was stored at 4 °C. The crude extracts of *S. samarangense* was qualitatively tested for identification of phytochemical elements using the different reagents.¹⁴

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Albendazole from Beximco Pharmaceutical Ltd., 0.2% v/v Tween-80 from Loba Chemie Pvt Ltd., India were used for the experiment.

Live parasite named *Haemonchus contortus* (Nematoda) were collected from clearly slaughtered cows at Gollamari (in Khulna, Bangladesh) abattoirs and identification was done by Dr. Md. Royhan Gofur, Lecturer of Animal Husbandry and Veterinary science, Rajshahi University, Bangladesh.

The anthelmintic activity of *S. samarangense* was investigated by using the method of Ali *et al.*, through clean mature roundworms.^{15,16} Test samples of the aqueous ethanolic extract of *S. samarangense* were arranged at concentrations of 200, 100, 50 and 25 mg/ml in normal saline. Five worms of just almost same size were positioned in a petridish containing 25-200 mg/ml of the trial solutions of *S. samarangense*. Tween-80 (0.2%) and solutions of albendazole (15 mg/ml) each containing five test worms was used as negative control and standard respectively. The time (min) taken for paralysis and death in the worms to develop was noted. When all movement had stopped it was defined as paralysis and when no movement occurred it was defined as

death upon shaking or placing the worms into warm water (50°C).

The *in vitro* experimental results (for anthelmintic test) are given as mean \pm SEM. Data was evaluated by using relative index. Assuming standard drug has relative index of 1, the effect of extract was compared with the standard relative index, which showed significant effect. Results were processed by Microsoft Excel (2010) and online SD and SEM calculator software.

In the present study the ethanol extract of *S. samarangense* was found to show anthelmintic activity which was compared to as standard drug albendazole. Ethanol bark extract at concentrations of 25, 50, 100 and 200 mg/ml showed paralysis of parasites at 23.42, 12.34, 5.25, 3.24 min and death times were found at 29.34, 21.33, 9.3, 6.3 min respectively. Standard albendazole also showed paralysis time at 15.36 min and death time at 20.36 min (Table 1). From the above result, it is clear that bark extract has anthelmintic activity in dose the dependent manner which was comparable with standard anthelmintic drug.

Table 1. Anthelmintic activity of *S. samarangense* extracts against *H. contortus*.

| Serial no. | Group | Conc. | Paralysis time (Mean \pm SEM) | Relative index (P) | Death time Time taken (Mean \pm SEM) | Relative index (D) |
|------------|---------------|-----------|------------------------------------|-----------------------|--|-----------------------|
| 1 | Control Group | 0 | -- | -- | -- | -- |
| 2 | Albendazole* | 15 mg/ml | 15.36 \pm 0.08 | 1 | 20.36 \pm 0.11 | 1 |
| 3 | Extract | 25 mg/ml | 23.42 \pm 0.10 | 1.52 | 29.34 \pm 0.13 | 1.44 |
| 4 | Extract | 50 mg/ml | 12.34 \pm 0.106 | 0.80 | 21.33 \pm 0.134 | 1.04 |
| 5 | Extract | 100 mg/ml | 5.25 \pm 0.109 | 0.34 | 9.30 \pm 0.112 | 0.45 |
| 6 | Extract | 200 mg/ml | 3.24 \pm 0.08 | 0.21 | 6.30 \pm 0.10 | 0.36 |

Key: Relative index (P) denotes the time taken for paralysis to occur using *S. samarangense* extract/the time taken for paralysis to occur using the standard*. Relative index (D) denotes the time taken for death to occur using *S. samarangense* extract/the time taken for death to occur using the standard*. Experimental times were recorded in minutes.

Phytochemical investigations indicated that reducing sugar, tannins, flavonoids, saponins, gum, alkaloids were present in the bark extract of *S. samarangense*.

In anthelmintic test for the activity, plant extract was normally investigated on the basis of paralysis

and death of live parasites. The extract revealed concentration dependent paralysis and death time, which were compared with albendazole. While the mechanism of anthelmintic activity of extract is unknown but polyphenolic compounds may play a major role. From phytochemical screening we found

that tannins were present in the extract. Tannins may serve anthelmintic action by facilitating energy depletion in helminthes by uncoupling oxidative phosphorylation.

In the present study the ethanolic extract of bark of *S. samarangense* showed dose dependent anthelmintic activities. However, these preliminary studies do not describe the actual mechanism of action of these activities.

Further investigations are required to isolate the bioactive compounds responsible for the pharmacological activity of this plant.

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