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Short Communication

Cytotoxic Studies on Two *Meliaceae* plants: *Chukrasia Tabularis* and *Aglaia Roxburghiana*

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Abstract

The paper details a biological investigation on *chukrasia tabularis* and *aglaia roxburghiana*, species of *meliaceae*. The methanol crude extract of *chukrasia tabularis* and *aglaia roxburghiana* have been screened for antitumor potentials using brine shrimp lethality bioassay with ten different concentrations. An established cytotoxic agent vincristine sulphate has been used to compare the results. From the graphs the concentration of methanolic crude extract yields the value of LC_{50} (50% mortality) as 1.58µg/ml and 2.21µg/ml for *chukrasia tabularis* and *aglaia roxburghiana,* respectively. In the same way the concentration at which 90% mortality (LC_{90}) occurs for the methanol extract are obtained from the graphs and the values have been found to be 141.41µg/ml and 70.70µg/ml for *chukrasia tabularis* and *aglaia roxburghiana,* respectively.

Keywords: Chukrasia tabularis; Aglaia roxburghiana; *Meliacea;* Cytotoxicity.

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1. Introduction

Bangladesh is a good storehouse of medicinal plants. *Chukrasia tabularis* is an evergreen or deciduous tree up to 30m with a straight bole that is branchless up to 25m. Within *meliaceae*, *aglaia* represents the largest genus comprising somewhat more than 100 species [1]. This genus encompasses dioecious trees. Previous chemical studies revealed the isolation of cycloeucalenol, cyclomahogenol, cycloswietenol, chukrasin-A, chukrasin-B, chukrasin-C, chukrasin-D, chukrasin-E, 5,7-dihydroxy-2′,4′,5′,6-tetra- methoxy flavone or tabularin, mahonin [2] from c*hukrasia tabularis*. Triterpenes are generally considered as main constituents of *aglaia*, accompanied by significant amounts of sesquiterpenes. Together with typical bisamides, flavaglines represent distinct phytochemical

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characters restricted to the genus *aglaia* [3]. Some previously isolated compounds are 29-norcycloart-23-ene-3β,25-diol, 24,25-epoxy-29-norcycloartan-3β-ol, roxburghiadiol-A, dehydroodorine, 2-hydroxyroxburghilin, N-cinnamoyl-2-(2-methylbutanoyl amino) [2]. Benzofurans, unique structures of the genus *aglaia*, were shown to possess high insecticidal properties [3-6]. High fungicidal activity was also detected against the rice blast disease [7]. Furthermore, platelet aggregation inhibitory effects [8], antiviral [9], antibacterial [10] and anthelmintic bioactivities [11] were reported for this genus.

2. Materials and Method

Crude extract of *chukrasia tabularis* and *aglaia roxburghiana* were prepared by using cold extraction process in methanol. 4 mg crude extract of *chukrasia tabularis* and *aglaia roxburghiana* were taken and dissolved in 200µl of pure dimethyl sulfoxide (DMSO) in two vials to get stock solutions of 400µg/ml. A series of solutions of different concentrations were prepared from the stock solution by serial dilution method and the concentrations were as: 400µg/ml, 200µg/ml, 100µg/ml, 50µg/ml, 25µg/ml, 12.5µg/ml, 6.25µg/ml, 3.125µg/ml, 1.5625µg/ml and 0.78125µg/ml. Then the samples were subjected to brine shrimp lethality bioassay [12, 13] for cytotoxic studies. In each test tube, containing different concentrations of test sample, 10 brine shrimp nauplii (*artemia salina*) were added.

Two control groups were used in cytotoxicity study, to validate the test method and results obtained due to the activity of the test agent. In the study vincristine sulphate was used as the positive control. Measured amount of the vincristine sulphate was dissolved in DMSO to get an initial concentration of 20 µg/ml and serial dilutions were made using DMSO to get 10 µg/ml, 5 µg/ml, 2.5µg/ml, 1.25 µg/ml, 0.625 µg/ml, 0.3125 µg/ml, 0.1563 µg/ml, 0.078125 µg/ml and 0.0390 µg/ml of concentration. 30 µl of DMSO was added to each of three premarked glass vials containing 5 ml of simulated seawater and 10 shrimp nauplii to use as negative control groups. After 24 hours, the test tubes were observed and the numbers of survived nauplii in each test tube were counted and the results were noted. From this, the percentage of lethality of brine shrimp nauplii was calculated at each concentration for each sample.

3. Results and Discussion

In the present bioactivity study, the crude methanolic extract showed positive results indicating that the test samples are biologically active. Plotting of log of concentration (log C) versus percent mortality (% mortality) for all test samples showed an approximate linear correlation. From the graphs, the median lethal concentration (LC_{50}, the concentration at which 50% mortality of brine shrimp nauplii occurred) were determined but in few cases due to higher mortality rates LC_{50} cannot be determined and for them LC_{90} values were determined.

The crude extract of *chukrasia tabularis* showed significant cytotoxic activity against brine shrimp nauplii and LC_{50} value was 1.58 µg/ml (Table 1, Fig. 1). The 90% mortality

rate was also calculated to get the therapeutic index and the value was 141.41 µg/ml (Table 1, Fig. 1).

Table 1. Brine shrimp lethality bioassay of methanolic extract of *chukrasia tabularis.*

Conc. (µg/ml)	log C	% Mortality (1)	% Mortality (2)	Mean	LC_{50} (µg/ml)	LC_{90} (µg/ml)
400	2.602	100	90	95	1.58	141.41
200	2.301	100	90	95		
100	2.000	90	80	85		
50	1.699	70	80	75		
25	1.398	80	80	80		
12.5	1.097	60	80	70		
6.25	0.796	80	70	75		
3.125	0.495	50	40	45		
1.563	0.194	20	40	30		
0.781	− 0.107	20	30	25		

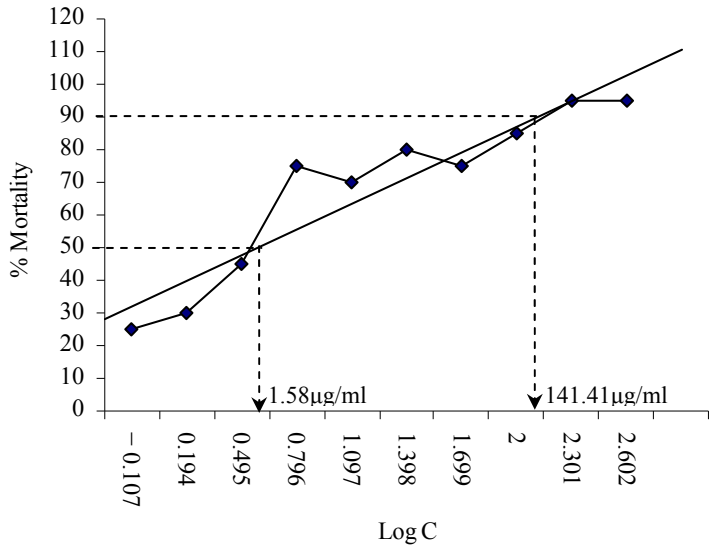

Fig. 1. Determination of LC_{50} and LC_{90} of methanolic extract of *Chukrasia tabularis.*

Similarly *aglaia roxburghiana* showed the LC_{50} value of 2.21µg/ml and LC_{90} value of 70.70µg/ml (Table 2, Fig. 2). For the conformity of the result, the test was done two times. An approximate linear correlation was observed when logarithm of concentration

versus percentage of mortality [14] was plotted on the graph paper and the values of LC_{50} were calculated using Microsoft Excel 2000. All the values were compared with vincristine sulphate whose LC_{50} was found to be 0.625 µg/ml.

Table 2. Brine shrimp lethality bioassay of methanolic extract of *aglaia roxburghiana.*

Conc. (µg/ml)	log C	% Mortality (1)	% Mortality (2)	Mean	LC_{50} (µg/ml)	LC_{90} (µg/ml)
400	2.602	100	100	100	2.21	70.70
200	2.301	100	100	100		
100	2.000	100	100	100		
50	1.699	100	90	95		
25	1.398	90	80	85		
12.5	1.097	80	90	85		
6.25	0.796	50	50	50		
3.125	0.495	60	50	55		
1.563	0.194	50	40	45		
0.781	− 0.107	40	40	40		

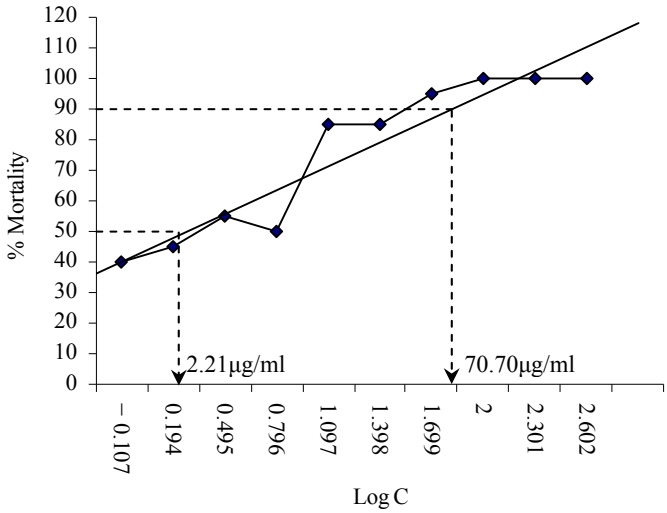

Fig. 2. Determination of LC_{50} and LC_{90} of methanolic extract of *aglaia roxburghiana.*

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