Int J Pharm Bio Sci 2013 July; 4(3): (B) 83 - 87

Research Article **Pathology**

International Journal of Pharma and Bio Sciences **ISSN 0975-6299**

COMPARATIVE EFFICACY OF *MOMORDICA CHARANTIA* LEAF AND SEED EXTRACTS AGAINST THE FILARIAL VECTOR *CULEX QUINQUEFASCIATUS*

C.A ANNAPOORANI.* AND K. MANIMEGALAI.

Department of Zoology, Avinashilingam Institute for Home Science and Higher Education for Women Coimbatore – 641043, India

ABSTRACT

A comparative study using *Momordica charantia* leaf and seed extract on the fourth instar larvae of *Culex quinquefaciatus*. A maximum mortality (100%) was observed in petroleum ether leaf extract at 72hr and in seed extracts minimum larval mortality was observed in petroleum ether, chloroform and ethanol extracts.

KEYWORDS: ***Culex quinquefasciatus*, *Momordica charantia*, fourth instar larvae, maximum mortality**

C.A ANNAPOORANI.
Department of Zoology, Avinashilingam Institute for Home Science and Higher Education for Women Coimbatore – 641043, India

Corresponding author

INTRODUCTION

Mosquitoes can transmit more diseases than any other group of arthropods and affect millions of people throughout the world. WHO has declared the mosquitoes as “Public enemy number one”[1]. *Culex quinquefasciatus* is the major vector of bancroftian filariasis, which is also a common pestiferous mosquito and it is responsible for 50-60 percent of annual filarial incidence in India. It is a ubiquitous mosquito which prefers to breed in polluted water habitats like drains, cesspits, cesspools etc. They are more common in urban areas due to the availability of numerous breeding sources[2.] Synthetic insecticides in vector control has resulted into environmental hazards through persistence and accumulation of non-biodegradable toxic components in the ecosystem, development of insecticide resistance among mosquito species, biological magnification in the food chain and toxic effects on human health and non-target organisms. These developments prompted researchers to look for other alternative insecticidal agents with high bio control potentiality but with least or no harmful effects to environment and human health[3]. Plant extracts for insect management has numerous appealing attributes, as these are usually more biodegradable, much less hazardous and rich store house of chemicals of diverse biological activity[4].

METHODOLOGY

(i) Laboratory culture of larvae

Hay infusion method was adopted for culturing mosquito larvae. Hay was taken, cut into small pieces and boiled in 5 litres of water for 20 minutes. After cooling, this water was poured into buckets and kept in different areas where mosquitoes were abundant. After one or two days eggs were laid by female mosquitoes in clusters forming an egg raft. The egg rafts were collected and maintained in the laboratory. The third instar larvae were collected, reared in enamel trays containing culture medium and provided with powdered dog biscuits and yeast in the ratio of 3:1 as the nutrient source. Immediately after molting, the fourth instar larvae were introduced into beakers containing 200 ml of water and used for the bioassay studies.

(ii) Preparation of leaf and seed extracts

Fresh leaf and seeds of *Momordica charantia* were collected, washed in water and air dried under shade. Dried leaves and seeds were powdered using an electric pulverizer. Fine powder was obtained by sieving.. 10g of the seed powder was weighed and made into packets using Zerohaze filter paper. This powder was subjected to extraction with 500 ml of the solvents such as petroleum ether, chloroform, and ethanol for 8h using a Soxhlet apparatus. Petroleum ether (60-80°C) extraction was followed by chloroform extraction and ethanol extraction, so that the powders were subjected to extraction with solvents of increasing polarity. The leaf and seed extract thus obtained was concentrated by distillation and dried by evaporation at 40°C.

(iii) Test for larvicidal activity

The larval mortality in both treatment and control was recorded at 24h of treatment and the percentage of mortality was calculated using Abbott’s formula[5].

$$\% \text{ Mortality} = \frac{\text{Mortality in treatment (\%)} - \text{Mortality in control (\%)}}{100 - \text{Mortality in control (\%)}}$$

(iv) Statistical analysis

The data on bioassay studies were also subjected to one way Analysis of Variance (ANOVA) as described by [6]. Further LC_{50}, LC_{70}, LC_{90}, Regression equation and 95 percent Upper Confidence Limit (UCL) and Lower Confidence Limit (LCL) and Chi-square values were calculated by using probit analysis[7].

RESULTS

Table 1

Larvicidal activity of Momordica charantia leaf extract against Culex quinquefasciatus

Solvent used	Hours	LC50	LC70	LC90	Regression equation	95% Confidence limit			
						UCL		LCL	
						LC50	LC90	LC50	LC90
Petroleum ether	24	596.95	795.84	1205.32	-6.660 + 4.200x	859.74	2794.40	414.49	519.89
	48	463.02	833.23	1945.90	-.4798 + 2.055x	655.62	14365.79	326.99	263.58
	72	450.74	522.03	645.26	-16.83 + 8.227x	554.57	1056.92	366.36	393.94
	96	1205.13	2028.94	4303.84	-2.14 + 2.31x	6.379	1.275	2.276	1.451
Chloroform	24	2073.13	5090.16	18615.5	.540 + 1.344x	98328.46	1.0285	43.709	3.369
	48	568.64	748.78	1714.01	-7.091 + 4.389x	779.20	2353.50	414.98	527.311
	72	1313.85	2451.12	6029.92	-1.040+ 1.936x	10147.17	487596.6	170.11	74.569
	96	707.19	1028.04	1764.21	-4.200 + 3.228x	1324.68	7442.42	377.54	418.20
Ethanol	24	475.92	553.76	689.13	16.34 + 7.972x	535.06	892.35	423.31	532.1
	48	16.163	4.733	.803	6.188 + .983x	414573.5	.80391	6.30175 E-04	1.526063 E-04
	72	89.389	49.01	20.615	-8.925 + 2.011x	708.933	1531.49	11.271	.27751
	96	7924.28	2931.28	106314.4	.5679 + 1.136	2.20762	1.4771	.28444	7.6515

Table 2

Larvicidal activity of Momordica charantia seed extract against Culex quinquefasciatus

Solvent used	Hours	LC50	LC70	LC90	Regression equation	95% Confidence limit			
						UCL		LCL	
						LC50	LC90	LC50	LC90
Petroleum ether	24	739.24	978.77	1467.72	-7.34+4.30x	1361.31	4750.84	401.43	453.43
	48	1.20	1.70	1.70	3. 35+4.99x	1.70	1.70	5.87	5.87
	72	-	-	-	-	-	-	-	-
	96	942.08	1328.67	2182.66	-5.44+3.51x	2675.02	15101.3	331.78	315.47
Chloroform	24	2.40	1.61	1.95	2.88+.18x	1.70	1.70	5.87	5.87
	48	852.72	1176.82	1873.59	-5.98+3.74x	1998.69	9365.64	363.80	374.81
	72	-	-	-	-	-	-	-	-
	96	942.08	1328.08	2182.66	-5.44+3.51x	2675.02	2182.66	331.78	315.47
Ethanol	24	2494.36	4807.74	12397.61	-1.25+1.84x	45729.7	2.00	42.69	7.64
	48	799.12	1134.21	1880.32	-5.01+3.44x	1718.99	8942.33	371.49	395.38
	72	1627.42	2718.15	5699.88	-2.56+2.35x	19766.23	532689.7	133.99	60.98
	96	81.04	49.90	24.79	9.75+2.49x	733.65	1357.29	8.95	.452

High larval mortality (100%) has been observed in leaf extract of *Momordica charantia* in 380ppm and 400ppm at 96hr compared with seed extracts. High reduction in adult emergence and increased period of larval stage as larval extension was observed in remaining concentrations. In seed, minimum larval mortality was observed in petroleum ether, chloroform and ethanol extracts and comparatively less effect with leaf extract. Larval extension period was more in all doses of seed extracts ranging from 300ppm to 400ppm when compared to leaf extracts. 72 hr LC_{50} value of petroleum ether leaf extract was 450.74ppm with a regression equation of Y=-16.83+8.227X as compared to chloroform and ethanol extracts (Table I).LC_{50} value of seed was high in petroleum ether extract 1.20 ppm at 48hr with the regression equation of Y=-3.35+4.99X when compared to chloroform and ethanol extracts(Table2). Abnormalities were observed in pupal stage. Few pupae were non melanized, few were partially melanized and few were hyper melanized as compared to the control. Pupal adult intermediates were seen in ethanol extract of both leaf and seed. These abnormalities in the metamorphosis of larvae could be due to an imbalance in hormones because of Plant extracts. Petroleum ether extract of leaf (450.74ppm) has highest toxic effects when compared to the seed extract

DISCUSSION

Biologically active plants show great promise for their potential efficiency as larvicides. Alcoholic and acetone extracts of *Andrographis paniculata* had a pronounced larvicidal effect on mosquito *C. quinquefasciatus*. It may be due to the presence of the phytochemicals such as alkaloids, carboxylic acids, flavanoids, phenols, proteins, quinines, resins, steroids and saponins[8] The efficacy of phytochemicals against mosquito larvae can vary significantly depending on plant species, plant parts used, age of plant parts solvent used during extraction as well as upon the available vector species[9. 10] High percentage mortality of fourth-instar larvae of *C.quinquefasciatus* in the petroleum ether extract of *Indigofera tinctoria* and *Madhuca longifolia* showed a mortality of 10 percent and 5 percent respectively at 250 ppm concentration. [11]and [12] Various defective stages such as non-melanized, partially melanised hyper melonized and half ecdysed forms.In the present study several morphogenic abnormalities were observed in treatment with all the leaf and seed extracts. Plant extract was found to be more toxic to the larvae of *An.stephensi*, 1.5% induced 100% larval mortality within 24hr of exposure period. On the contrary in *C.quinquefasciatus* 100% mortality was obtained at 24hr in high concentrations viz, 2.5 and 4.0% respectively[13.]

REFERENCES

1. World Health Organization.1996. Report the of WHO informal consultation on the evaluation on the testing of insecticides, CTD/ WHO PES/IC/96.1.Geneva: P.69.
2. John William,S., 2000. Mosquitoes mankind's enemy. Proceedings of national symposium on recent trends in combating mosquitoes. Loyola college, Chennai, P – 1-9
3. Sharma,P., Mohan,L. and Srivatava, C.N. 2006. Phyto extract –induced developmental deformities in malaria vector.Biores.technd,97.1599-1604
4. Jordan,M. 2012. larvicidal Activities of Aquous Extracts of Nineteen Indian Plants Against two mosquito species.http://shizizuoxkyn.com/gushi – 8e248e 650100z7fz.htm.
5. Abbott, W.S. 1925.A method of computing the effectiveness of an insecticide: J.Econ. Entomol., 18, 265-267.

6. Panse, V.G. and Sukhatme, P.V.1985.Statistical methods for agricultural works, 4th edition, ICAR, New Delhi, P .359.
7. Finney, D.J. 1971.Probit analysis. 3rd Edn University press, Cambridge. P. 1-80.
8. Jayanthi, C.A.2009.Phytochemistry and antibacterial activity of *Andrographis paniculata* (Burm.f.) wall ex Nees. M.Sc. Thesis, Department of chemistry, Scott Christian College (Autonomous), Nagarcoil, Tamilnadu, India
9. Sukumar, K., Perich, M.J., Boobar, L.R.1991. Botanical derivatives in mosquito control:a review. J Am Mosquito ASSOC: 7:210-37
10. Kalyanasundaram, M.and Babu.C.J.1982. Biologically active plant extracts as mosquito larvicides. Ind.J.Med.Res., 76: Supplement, 102-106
11. Zebitz, G.P.W., 1984.Effect of some crude and azadirachtin enriched neem (*Azadirachta indica*) seed kernel extracts on larvae of *Aedes aegypti* .Entomol.Exp.Appl., 55:11-16
12. Saxena, a. and Saxena, R.C. 1992. Effect of *Ageratum conyzoids* extracts on developmental stages of malarial vector, *An.stephensi* (Diptera: Culicidae).J.Environ.Biol.,13(3): 207-209
13. Jalees, S., Sharma,S.K., Rahman, S.J.and Verghesee, T.1993. Evaluation of insecticidal properties of an indigenous p lant, cannabis sativa Linn., against mosquito larvae under laboratory conditions. J. Ent.Res., 17(2):117-120.

.