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Research Article

INSECT REPELLENT INDUCED LIPID DIVERSIONS OF PERIPLANETA AMERICANA

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ABSTRACT

In the present study we investigate the changes in Lipid contey of Cockroach *Periplaneta americana* exposed to to insect repellent allethrine. After 4,8,12,16,20 days caused decreased level of Lipid content in both the male and female cockroaches.

INTRODUCTION

Human walfare is materially affected in multiplicity of way by the insect. The major is the less in agricultural and public health field. The struggle between man and insects began long before the civilization, and will continue, no doubt as long as human race endures. Mankind has made, but little progress in its age old battle against the insects. Insecticides are the broad spectrum poisons which also kills the non insect pests (Nath *et al.*, 1997; Suh *et al.*, 2000). The toxicity and persistence of the pesticide is specific in its action (Moor 1969) (Rural medicine 1:1) The toxicity of the particular pesticides depends upon many factors like the weight of the target animal (Bhagyalaxmi 1981) its stage of development and the period of exposure (Macek *et.al* 1969). Pesticides can be grouped in to different categories by their origin, chemical nature, and mode of action. Pyrethroids are currently among the major insecticides used against pests (Usmani and Knowles, 2001). The assessment of potential effects that insecticides have on natural enemies of pests will also contribute to success in IPM Programs. (Olga sak, Fevzi Uckan and Ekrem Ergin, 2006). Pyrethrum is botanical insecticide which is derived from the flowers of *Chrysanthemum*, primarily from *Chrysanthemum cinerariaefolium.* Pyrethrum is toxic to most of insect pests. Pyrethrum lacks persistence in the field because of its breakdown in sunlight; thus it leaves no harmful residues. It acts almost as a contact poison. One of the most fundamental criteria to understand stress condition is to study the alteration in the level of different biochemical Since these organic cellular component control the formation of intermediate metabolites which are indispensible to all the normal physiological processes. Hence, to study the changes in the levels of lipid is also a potent approach to assess the toxicity of pyrethroid repellent -"Tortoise".

Metabolic changes in the insects are generally accompanied in the process of chitin synthesis and energy liberation.

MATERIALS AND METHODS

The cockroaches, *Periplaneta americana* were collected from vicinity of household environment, sewage tunnels and from drainage pipes. During the experiment they were kept in well cages and fed with ground-nut cake and garbage material of vegetables. The cockroaches were acclimatized to the laboratory condition. They were exposed "Tortoise" (manufactured by Bombay chemicals Ltd.129, M G Road, Mumbai 400 023)-mosquito repellent coil available in the market. The tortoise mosquito repellent has a pyrethroid "Allethrine" (2-allyl-4 hydroxy-3 methyl-2 cyclopentane-1-one ester of chrysanthum monocarboxylic acid) *a.i.* 0.2% w/w as a chemical component. Every day for a period of 2 h, during evening from 7 to 9 o'clock, the smoke was administered in cages containing experimental cockroaches, *Periplaneta*

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americana. Experimental duration was for 20 days. After 4, 8, 12, 16, and 20 days of exposure period cockroaches were sacrificed and separated into male and female groups, containing at least 20 individuals each. A simultaneous set of male and female cockroaches of same number without toxic smoke exposure was maintained which acts as concurrent control. After sacrificing cockroaches from control and exposure groups, their body parts were isolated and dehydrated in hot air over at 7o C for 3 days and then made into fine powder with the help of mortar and pestle. This dry powder was subjected to analysis of lipid. The total lipid was estimated according to the method of Kemp and Kits (1954). The observations of lipid estimation was confirmed by repeating it at least for three times. The difference in control and treated values was tested for significance using student's 't' test (Bailey, 1965). The percentage difference was also calculated for each value.

RESULTS

Changes in the lipid metabolism of cockroach, *Periplaneta americana* due to allethrine stress was noted. For studying the effect of allethrine, the smoke was generated by burning of mosquito repellent coil was administered daily for two hours during 7 to 9 o'clock at evening. These results are compared with normal ones and were summarized in Table 1. A gradual initial increase and then decrease was noted in the total lipid content of cockroach, *Periplaneta americana* due to allethrine stress. It was 23.768 ±1.85 mg/g dry wt. and 26.285 ± 1.92 mg/g dry wt in control male and female cockoches respectively and found to be decreased after 20 days of exposure periods (23.84% and 41.24 % ; p< 0.01 and P < 0.001). in male and female cockroaches, respectively.

DISCUSSION

Lipid forms a major structural component of the exo and endo cuticle in insects (Salma *et al*, 1976). Several factors like age, sex, stage of development and supply of food material also affects the lipid content (Perincott, 1960). Lipid helps in acetylation of glucosamine-6-phosphate during chitin synthesis and also acts as a source of reserve material for chitin formation (Zaluska, 1959 and Wyatt, 1967). The level of the total body lipids was found to be elevated due to allethrine impact in the cockroach, *Periplaneta americana.* Similar results were recorded by Gilmour (1961) in several insects, Saxena and Srivastava (1969) in *Periplaneta Americana,* Saxena and Vinodkumar (1981) in *chrotogonus. Trachypterus* and by Patil P.N. (1986) in *mythimna separata* When treated with different pesticides. This increase can be explained on the basis of observation made by Covy and Jonson (1973). Detected the inhibition of lipase activity following organophosphate pesticide administration. Tissue steriodogenesis was activated and probably oriented towards the formation of corticosteroids, Since stress conditions elevates the corticosteroids in the blood of poisoned organisms. The degradation of amino acids give rise to ketoacids which may provide the acetate units for lipogenesis. The acetyl co. A condensate with the existing fatty acid, which may continue to increase the chain length of fatty acids and also the consequent esterification with glycerol mostly results in the formation of lipids.

CONCLUSION

Changes in the level of lipid metabolism were studied in the cockroach, *Periplaneta americana. Caused due to sub lethal dose of the respiratory repellent allethrine* after the periods of 4,8,,12,16,20 days. The level of the total lipid was found to be elevated where as depletion in cholesterol level was noted along with the inhibition in the activity of lipase enzyme was recorded in the cockroach, *Periplaneta americana.* due to allethrine stress.

Table Effect of allethrine on lipid content of *Periplaneta Americana*

Sex	Control	Periods of allethrine exposure				
		4 days	8 days	12 days	16 days	20 days
Male	23.768	24.870	26.936	23.324	19.941	18.100
	± 1.85	± 1.93	± 2.02	± 1.87	± 1.68	± 1.61
	%	+4.63	-13.32	-01.86	-16.22	-23.84
		NS	P<0.05	NS	P<0.01	P<0.01
Female	26.385	26.109	28.038	21.289	17.569	15.503
	± 1.92	± 1.80	± 2.01	± 1.86	± 1.54	± 1.47
	%	-01.04	+10.82	-19.31	-33.41	-41.24
		NS	NS	P<0.01	P<0.001	P<0.001

(All the values are expressed in mg/gm dry wt.)

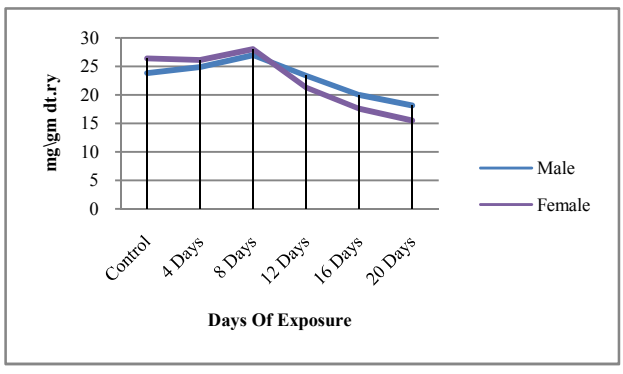

Figure 1 Lipid level (%) of *Periplaneta americana* exposed to allethrine After 4,8,12,16,20 days

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