Insect Repellent Induced Protein Diversions of *Periplaneta americana*

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**Abstract:** This paper reviews the toxicity of insect repellent allethrine in relation to protein in cockroach, *Periplaneta americana*. The male and female cockroaches were subjected to allethrinestress for 4, 8, 12, 16 and 20 days which showed increased levels of protein in both sexes.

**Keywords:** *Periplaneta americana*, Allethrine, Repellent Protein

**Introduction**

Pesticide research and development has brought a large number of chemicals in protecting the crop against insect pests. However, these chemicals have posed a grave environmental problem due to their indiscriminate usage in fields (Tillman & Mulrooney, 2000). Insecticides are also toxic to many non target organisms (Nath et al., 1997; Suh et al., 2000). Pyrethrum is botanical insecticide which is derived from the flowers of *Chrysanthemum*, primarily from *Chrysanthemum cinerariae folium*. Pyrethroids are currently among the major insecticides used against pests (Usmani & Knowles, 2001). 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 indispensable to all the normal physiological processes. Hence, to study the changes in the levels of glycogen is also a potent approach to assess the toxicity of pyrethroid repellent – “Tortoise”.

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 two hours, during evening from 7 to 9 o’clock, the smoke was administered in cages containing experimental cockroaches, *Periplaneta 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 70˚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 glycogen. The total body proteins were estimated as described by Harper *et al.*, (1978). The observations of proteins 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.

**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.

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Result

The protein level was found to be increased due to allethrine stress after all the periods of exposure in both male and female cockroach, *Periplaneta americana*. It was 83.887 ± 4.69 mg/gm dry et and 79.370 ± 3.97 mg/gm dry weight in control male and female groups and increased to its maximum after 20 days of exposure (57.64%; P<0.001) and after 16 days of exposure (40.59%; P<0.001) in male and female groups, respectively (Table).

Discussion

Increase in protein level in the cockroach, *Periplaneta Americana* was observed due to allethrine exposure in both the sexes. Similar increase was noted by Patil et al., (1995) in Thiara lineate and by Swami et al., (1983) in Lamillidens marginals during varied conditions including pesticidal protein synthesis after the repellent stress.

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<th>Table: Effect of allethrine on protein content of <em>Periplaneta americana</em></th>
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(All the values are expressed in mg/gm dry wt.)

Chart: Protein level (%) of *P. americana* exposed to allethrine for 4, 8, 12, 16, 20 days.

References


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