

Induced Effect of Pesticides on Pigeon (Liver, Kidney, Testis, Heart Muscles and Fat)

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Abstract: In the present study the induced effects of Permethrin, Decis and Monocrotophos have been observed against common pigeon *Columba tivia*. Two doses (20 and 40 units) of each pesticides were applied. The selected concentration of Permethrin and Decis were 0.25% while in the case of monocrotophos it was 0.5% after 1 day, 3rd days, 7th days, 15th day and 28th days treatment mortality was noted in all three pesticides. 3 days post treatment with 20 unit dose cholinesterase activity and protein contents were also estimated in liver, kidney, muscles, heart and testis injection method was adopted for pesticide application.

Key words: Pesticide effects, pigeon, cholinesterase, protein

Introduction

A variety of chemicals (pesticides) are repeatedly applied in our agricultural land and these pesticides can accumulate in animal bodies which concentrate them and pass from prey to predator, concentrate in successive steps of the food chain. As predatory birds reports are near the top of the chain and are especially vulnerable of accumulation large dosage of certain chemicals OC (organochloride) and OP (organophosphate) accumulates in the fatty tissue of animals and can be passed on through the food chain to concentrate in top level consumers. The toxic effect of pesticides (OC, OP, pyrethroid and other group) is not known. Several studies have investigated cholinesterase activity in birds as a method of monitoring exposure after application of pesticides (Hayes and Wayland, 1975; Grue *et al.*, 1983, 1991; Hart, 1993). David (1981) observed a strong repellent action of technical and formulated permethrin administered to quail in feed although repellency diminished with repeated exposure. Brain cholinesterase activity offers a more precise measure of OP effect than plasma cholinesterase level and a 50% level of inhibition has been proposed to identify OP induced mortality following exposure in adult birds (Ludke *et al.*, 1975 and Hill *et al.*, 1975), cholinesterase activity useful as an indirect means of monitoring exposure of bird to application of anticholin pesticide. Inhibition levels of at least 20% are generally considered indicative of pesticide exposure (Ludke *et al.*, 1975, Hill, 1989). Pesticides have a negative impact on non-target species like honey bees fish, bird and wildlife within and outside agroecosystem so in the present study the induced effect of permethrin Decis and monocrotophos in liver, kidney, testis, muscles, heart and fat of pigeon were observed.

Materials and Methods

Selected organism

The selected organism was common pigeon *Columba livia* which belong to order columbiformes. This bird very cosmopolitan through out the world. They feed grains. Experimental birds purchased from local market of Karachi city. After that they were kept in laboratory condition for three days after this experimental work start.

Toxicant used

Permethrin, decis and monocrotophos were used. The selected concentrations were 0.25% for permethrin and decis while 0.5% for monocrotophos. The applied doses were 20 units and 40 units respectively.

Method of treatment

Vivo method of treatment was applied (injection method) 20 units and 40 units of each pesticides were injected in pigeon abdominal region after application of pesticides. The observation were taken, 1, 3, 7, 15 and 28 days intervals of treatment. Cholinesterase activity and protein contents were estimated in target organisms (liver, kidney, heart muscles, testis and fat) after three days of treatment cholinesterase activity protein contents were estimated by kit method (Bioscience) for protein estimation and cholinal cat # KC060 for cholinesterase estimation.

Results

Toxicity determination

Permethrin treatment

0.25% concentration of permethrin was applied 20 units and 40 units of this concentration was applied in abdominal region of pigeon after 1 day, 3 days, 7 days and 28 days of treatment mortality was observed 20 units of post treatment no mortality was noted upto 28 days whereas at 40 unit dose after 7 days of treatment death caused in two experiments while in one case target organism alive after 7 days but death cause after 15 days (Table 1).

Table 1: Observed mortality after permethrin treatment at 0.25% concentrations against common

Dose	1 days	3 days	7 days	15 days	28 days
20 units	Alive	Alive	Alive	Alive	Alive
"	"	"	"	"	"
"	"	"	"	"	"
40 units	"	"	Dead	-	-
"	"	"	"	-	-
"	"	"	Alive	Dead	-

Decis treatment

0.25% concentration of decis was applied 20 units and 40 units of this concentration was applied in abdominal region of pigeon after one day, 3 days, 7 days and 15 days of treatment

Table 2: Observed mortality after decis (0.25%Concentration) treatment against common

Dose	1 days	3 days	7 days	28 days
20 units	Alive	Alive	Alive	Dead
"	"	"	"	"
"	"	"	"	Alive
40 units	"	"	Dead	-
"	"	"	"	-
"	"	"	"	-

Table 3: Observed mortality after monocrotophose treatment (0.5% concentration) against common pigeon

Dose	1 days	3 days	7 days	15 days	28 days
20 units	Alive	Alive	Alive	Alive	Alive
"	"	"	"	"	"
"	"	"	"	"	-
40 units	"	"	"	Dead	-
"	"	"	"	"	-
"	"	"	"	"	-

Table 4: After 72 h of treatment (20 units) cholinesterase activity in common pigeon

Parameter	Permethrin %	Decis %	Monocrotophos %
Control	100	100	100
Liver	69.38	54.36	80.21
Kidney	53.12	34.38	65.31
Muscles	48.80	38.10	74.86
Testis	80.24	63.49	82.15
Fat	32.49	20.12	42.06
Heart	74.32	64.13	80.13

mortality was noted. After 20 units of application no mortality was observed after 7 days but after 15 days in two experiments mortality was observed. In the case of 40 units treatment mortality was noted after 7 days of treatment (Table 2).

Monocrotophos treatment

In the case of monocrotophos the applied concentration was 0.5% while the selected doses were 20 units and 40 units. After 20 units application mortality was observed after 28 days in one experiment while no mortality was observed in other two cases. Whereas after 40 units application after 15 day treatment mortality was observed in all cases (Table 3).

Table 5: Protein contents after 72 h of treatment (20 units) of dose injected in pigeon body

Parameter	Permethrin	Decis	Monocrotophos
Control	100.00%	100.00%	100.00%
Liver	84.32%	54.39%	70.80%
Kidney	45.43%	49.70%	63.12%
Muscles	70.82%	32.28%	75.12%
Heart	62.74%	23.70%	54.02%

Cholinesterase activity

Cholinesterase activity was observed in pigeon liver, kidney, muscles, heart, testis and fat after permethrin, decis and monocrotophos treatment observation were taken after 3 days of 20 units of treatment (Table 4).

Protein contents

Protein contents were estimated in pigeon liver, kidney, muscles and heart after permethrin, decis and monocrotophose treatment. The observation taken after 3 days of treatment. Injection method was applied (Table 5).

Discussion

The pesticides tend to become concentrated as they move up the food chain they accumulate in organism body (target and non-target organism) which content tem. The pesticides don't kill the individual birds often but do affect their bodies so that they lay eggs with very thin shells often these thin-shelled eggs break or the birds are unable to reproduce and pesticides also affect birds physiological functions. In most cases pyrethroids are less toxic to mammals but they produced harmful effect on birds population. Natural conservation committee and Royal Society for birds protection suggested that indirect effect of pesticides was a major cause of decline birds species. Synthetic pyrethrods are extremely effective as agricultural insecticides they have toxic effect on higher animals (Casida, 1980). In 1995 the pesticide monocrotophos, sprayed to kill grasshoppers, was responsible for the deaths of at least 20,000 Swainson, Hawks in Argentina (American Bird conservancy and other organization over 150 bird "die-offs" involving as many as 700 birds in a single incident have been attributed to diazinon, an organophosphate insecticide birds fatalities and additional evidence concerning the extreme toxic of diazinon and its metabolites to aquatic invertebrates and mammals have prompted the US fish and wildlife service and a consortium of environmental organizations. About 40 active ingredients in pesticides have been found to be lethal to birds, even when used according to the instruction on the label. The active ingredients that have proven to be dead list to birds include diazimon, phorate, carbofuran, monocrotophos, isofenphos and other OPs Nicolaus and Lee (1999) observed the effect of organophosphate and carbomates on black bird in filed

conditions, they also reported inhibition in cholinesterase activity, Goldstein *et al.* (1999) reported the effect of monocrotophos against hawks population. This pesticide produced adverse effect on anticholinesterase activity. Haya (1989) studied the effects of pyrethroids on fish he reported pyrethroids were toxic to fish. Wilson *et al.* (1991) reported that organophosphate produced inhibitory effect on enzymes level of Hawks Mineau (1993) and Burgees *et al.* (1999) determined the effect of organophosphate and carbamate on birds population they kill birds in a large number. In the present research three pesticides have been tested against common pigeon. The less toxic pesticide belong to OP groups (monocrotophos) while pyrethroid group was more toxic to birds. Elliott *et al.* (1972) described that pyrethroid is extremely toxic to aquatic life. Such as bluegill and lake trout whereas Bradbury and Coats (1982) reported that pyrethroid have high tolerance against birds, Ruigt (1985) stated that pyrethroids directly effect on nervous system of target organism and ultimate results in mortality. All previous reported research support. Present study all three pesticides permethrin, decis and monocrotophose produced toxic effect against common pigeon they also inhibited cholinesterase activity and protein contents.

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