



Short Communication

Chronic Effect of Pesticides on Collagen Content of Freshwater Bivalve, *Parreysia Corrugata*

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Available online at: www.isca.in, www.isca.me

Received 29th June 2016, revised 3rd September 2016, accepted 5th September 2016

Abstract

Fresh water bivalves, *Parreysia corrugata* were exposed to Sublethal concentrations of quinalphos (0.108 ppm.) and thiodan (0.0708 ppm) for the duration of 15 and 30 days. Chronic exposure to pesticides altered the collagen content in various tissues of *P. corrugata*. It was found to be increased in gills, gonads and digestive glands of pesticide exposed *P. corrugata*. It was higher in gills followed by gonads and digestive glands. Probable causes of increase were discussed.

Keywords: Freshwater bivalve, Collagen, Quinalphos, Thiodan.

Introduction

Pesticides are known to cause alterations in biochemical and physiological activities of various non-target aquatic animals¹⁻⁴. Freshwater bivalves are one of the major victims of these effects. Alteration in organs involved in detoxification mechanism caused due to acute and chronic toxicities of pesticides⁵. Impact of methyl parathion was evaluated on protein content in tissues of *Pila globosa*⁶.

The effect of abnormal pH and pH cum endosulfan was found on ascorbic acid content in *Lamellidens marginalis*⁷. Changes in biochemical composition of malathion exposed *Bellamyia (viviparous) bengalensis* were also observed⁸. Collagen is one of the important biochemical constituents in animal body. It is a type of fibrous structural protein in the connective tissue. Contamination of water due to Pesticides like quinalphos and thiodan leads to changes in collagen content in the tissues of freshwater bivalve, *Parreysia corrugata*.

Materials and Methods

Freshwater bivalves, *Parreysia corrugata* were brought to the laboratory and used for investigation. They were exposed to sublethal concentrations of quinalphos (0.108 ppm.) and thiodan (0.0708 ppm) for 15 and 30 days. After the exposure period, bivalves were dissected to obtain their gills, gonads and digestive glands. These tissues were dried in oven at 75^o C to 80^o C and blended into dry powders which were used for the estimation of collagen. Collagen estimation was carried out by Woessner method of determination of hydroxyproline in tissue and protein sample. Results were summarized and analyzed statistically.

Results and Discussion

Collagen is a long fibrous, structural protein. It is a chief component of the extracellular matrix and also found inside certain cells. It is the main constituent of basement membrane, cartilage, ligaments, tendons, bones, fascia and teeth. In present investigation total collagen content in gills, gonads and digestive glands of freshwater bivalve, *Parreysia corrugata* was found to increase due to chronic exposure (15 and 30 days) to sublethal concentrations of quinalphos and thiodan. Increase in collagen was time dependant. It was higher in gills followed by gonads and digestive glands (Table-1).

Stress due to toxic substances in organisms influences collagen content in their body. Few workers reported decrease in collagen content in various organisms on exposure to heavy metals^{9,10}. Decrease in collagen level in the tissues may be the result of attachment of heavy metals with disulphide linkages of collagen. Anomalous collagen produced may be acted upon by enzyme collagenase and destroyed leading to its depletion. The decrease in collagen content might be due to competition between enzymatic detoxification process and organochlorine insecticide for vitamin C causing its deficiency¹¹. Vitamin C is required for the synthesis of collagen by means of hydroxylation of proline. Present study shows increase in collagen content in tissues like, gills, gonads and digestive glands of *Parreysia corrugata* when exposed to pesticides, quinalphos and thiodan. Changes in the collagen influence the structure of basement membranes of epithelia which can be responsible for alteration in an interaction between cell and outside matrix. The hepatopancreas, testes and gills have major epithelial structures. Variation in the collagen level can alter the physiological status of epithelium. Increased level of the collagen in the basement

membranes checks the flow of metabolites between the epithelia and connective tissue and causes poor functioning of the epithelia. Collagen is secreted by the epithelial cells lying above

the basement membranes. When the basement membranes are structurally disturbed, the epithelia secrete more collagen to stabilize themselves on the basement membranes.

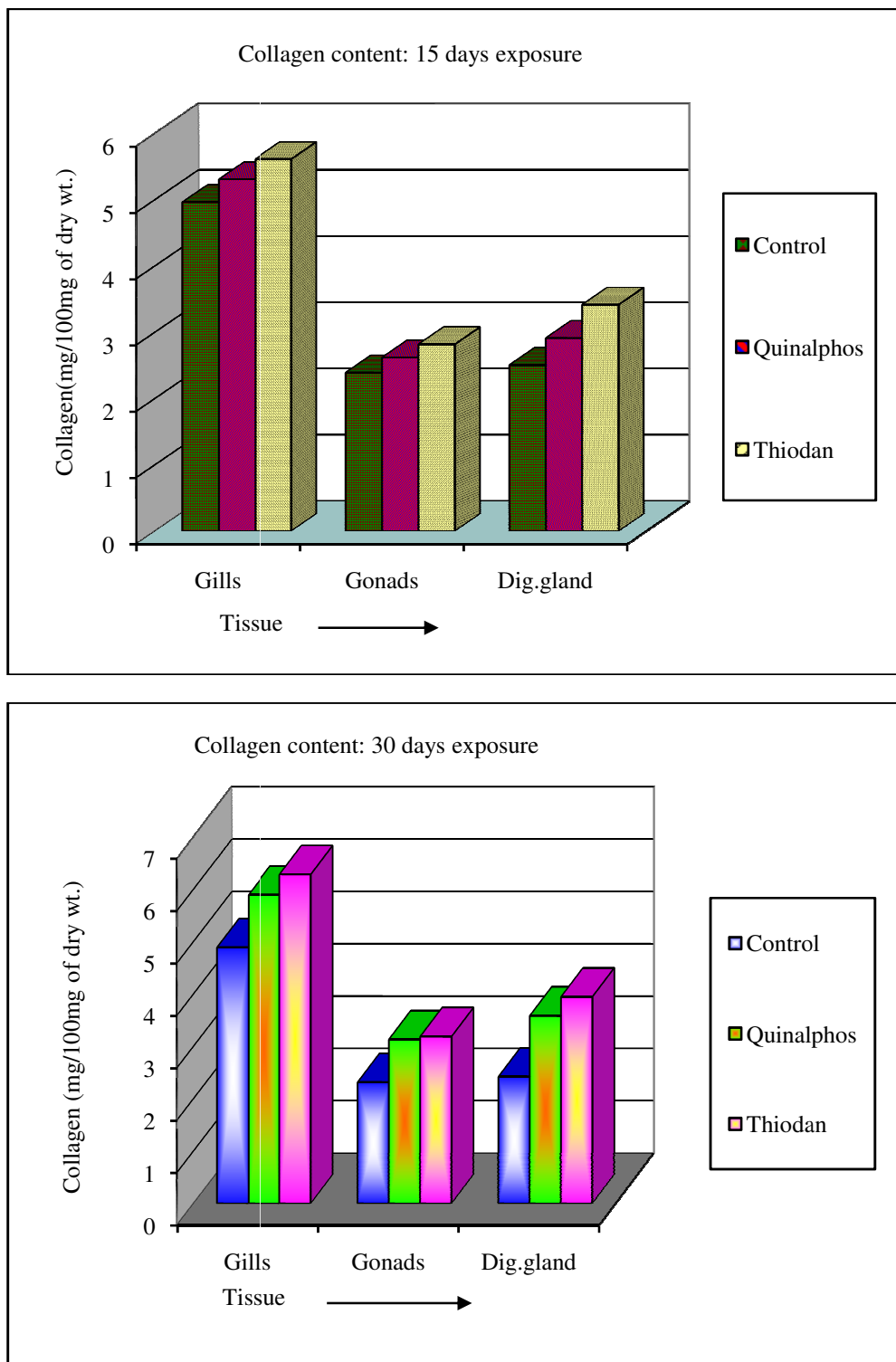


Figure-1

Collagen content in different tissues of control, quinalphos and thiodan exposed freshwater bivalve, *Parreysia corrugata* for different durations

Table- 1
Collagen content in tissues of freshwater bivalve, *Parreysia corrugata* exposed to quinalphos and thiodan

Sr. No.	Tissue	Control		Quinalphos (0.108 ppm)		Thiodan (0.0708 ppm)	
		15 days	30 days	15 days	30 days	15 days	30 days
1	Gills	4.961±0.35	4.89±0.25	5.307±0.48 ^{NS} (+6.974)	5.893±0.31 ^{**} (+20.44)	5.610±0.45 ^{NS} (+13.08)	6.279±0.42 ^{**} (+28.40)
2	Gonads	2.389±0.41	2.312±0.34	2.617±0.31 ^{NS} (+9.543)	3.131±0.26 [*] (+35.42)	2.816±0.25 ^{NS} (+17.87)	3.185±0.31 [*] (+37.75)
3	Digestive glands	2.503±0.41	2.42±0.38	2.910±0.29 ^{NS} (+16.26)	3.582±0.19 ^{**} (+48.01)	3.413±0.41 [*] (+36.35)	3.945±0.25 ^{**} (+63.01)

1. Values expressed as mg/100 mg of dry weight. 2. ± Indicates S. D. of five observations. 3. N.S. – Non significant, * - P < 0.005, ** - P < 0.01, *** - P < 0.001 4. (+) / (-) indicate % variation over control.

Conclusion

The deformed collagen is usually digested by the collagenase enzymes in normal case. However the pesticides might have affected the synthesis of the collagenase and hence the levels of the collagen in the pesticide exposed animals were increased.

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