Impact of Endosulfan on Neurosecretory cells of Land Slug,Laevicaulisalte.

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ABSTRACT: Incorporation of the toxic compound or their metabolites in lower organisms, as well as in the tissues of fishes, birds and humans have been recorded to cause serious morphological alterations in vital tissues of organisms even at very low levels.So the studies on the effects of pesticides on molluscan life are an important aspect of pollution. The studies on effect of the lethal concentration (LC_{50}) of pesticide endosulfan on the neurosecretory cells of the central ganglia such as cerebral, visceral and pedal ganglia have been carried out during pre-reproductive of land slug, Laevicaulisalte.Method- Slugs were treated with lethal concentration (LC_{50} concentration) of pesticide, endosulfan for 96 hr period during pre-reproductive.Sections of central ganglia (cerebral, visceral and pedal) were stained with Mallory's triple, Gomeri's chrome-hematoxylin phloxin (CHP) staining method. All the observations were made under light microscope to evaluate the changes at cellular level due to pesticide, endosulfan and photomicrographed.

Keywords: endosulfan,LC_{50},Laevicaulisalte.

Introduction:

. In mollusca, neurosecretory cells were first discovered by Scharrer (1935) in the cerebral and visceral ganglia of *Aplysia limacina*and *Pleurobranchaea*. Perusal of literature reveals that the aspect of neurosecretion in molluscs has been reviewed by Gabe (1965, 1966), Lubet (1966, 1973), Martoja (1972) and Golding (1974). The development of the subject has been hampered by the presence of shell, very small ganglia in small snails, diffused distribution of NSCs, and by the ignorance of the chemical nature of the neurohormones.In gastropods, the nervous system is constructed on the same general plan as in the other molluscs undergo.(Ahirrao et al.,2012)Amongst invertebrates, molluscs show great variability in their nervous system, ranging from primitive arrangement in chitons to the complex mass of fused ganglia forming the "brain" of cephalopods. Pharmacological and physiological aspects of molluscs using effector organs have received considerable attention (Huaddart, 1975; Bayne, 1976). Evidence for the occurrence of a wide variety of neurotransmitters in different tissues of bivalve molluscs including the nerve ganglia has been discussed from the functional point of view by Leak and Walker (1980). Gabe (1955) reported the presence of neurosecretory cells in 20 marine lamellibranch molluscs. Lubet (1955b) described the relationship between neurosecretion and sexual cycle in *Mytilus* and *Chlamys.*Thus, there are relatively very few reports on the impact of pesticides on the histopathological changes in molluscs. Most of the work in this connection has been dealt in vertebrates, especially on the fishes. Since litle work is carried out on slugs, except on neurosecretion and reproductive system of *L. alte* (Bodhankar, 1984; Vyawahare, 1988; and Jawalikar, 1989). In the present study an attempt has been made to study the effect of one of the tested pesticides, endosulfan on the neurosecretory cells of the central ganglia such as cerebral, visceral and pedal ganglia have been carried out during pre-reproductive, reproductive and post reproductive period of land slug, *Laevicaulisalte*.

MATERIAL AND METHODS

Fresh specimens of *Laevicaulisalte* were collected from the cultivated fields in and around Hinganwadi, Pale and Kalwan area of Nashik District and maintained under laboratory conditions in troughs with sufficient amount of moist soil. They were fed once in a day on carrot, potato or calotropis leaves. They were kept in laboratory for three days before subjected to experimentations. Healthy and mature animals of more or less equal size were selected and were starved during experimental period. Slugs were treated with lethal concentration (LC_{50} concentration) of pesticide, endosulfan for 96 h during pre-reproductive.After 96 h acute toxicity of endosulfan,central ganglia (cerebral, visceral and pedal) belonging to control and experimental groups (LC_{50} concentrations) were removed and fixed in aqueous Boiun's fluid fixative. The different tissues were then dehydrated in ethyl alcohol, cleared in xylene and embedded in paraffin wax (58-60°C). The sections were cut at 6-7 µ thickness on a rotary microtome.sections of central ganglia (cerebral, visceral and pedal) were stained with Mallory's triple, Gomeri's chrome-hematoxylin phloxin (CHP) staining method. All the observations were made under light microscope to evaluate the changes at cellular level due to pesticide, endosulfan and photomicrographed.

RESULTS:

1-A 1-B

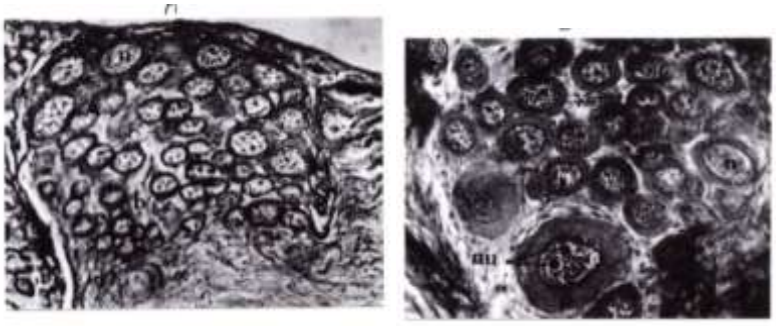

Fig. –(1-A-B-)Changes in the neurosecretory cells from cerebral ganglia of *Laevecaulisalte* due to pesticides, Endosulfan during pre – reproductive period.
A – control ; B – Experimental group (x 100)
(a – pyriform cells; ax – axon; b- oval cells; n – nucleus; nu – nucleolus;
nsm – neurosecretory material)

The Neurosecretory cells from cerebralganglia :

The observations of the cerebral, visceral and pedal ganglia showed the presence of cells, which are cytologically different and longer than ordinary, numerous neuronal cells. The neurosecretory cells are distributed along the periphery of the ganglia and each possesses a large nucleus with prominent cytoplasm. Their axons and perikariaare more or less filled with the secretory material stained conspicuously by different seasons.

Control :(fig- 1-A) Based on the differences in their size, shape, presence or absence of vacuoles and staining properties of secretory material, the two types of neurosecretory cells could be identified, cell type 'a' or pyriform cells and cell type 'b' or oval cells.

The changes in the neurosecretory material from cerebral, visceral and pedal ganglia was as follows:

Cerebral:(fig- 1-B) The secretory material in the cytoplasm of both the types of cells was granular. Most of the cells of type a contained large amount of secretory material while others contained no granules. The secretory material in the hillock and/or in the axons.Vacuoles in the cytoplasm appeared in large size in a few cells due to release of secretory material. In cell type 'b' the vacuoles are large but showed no characteristics shape.

2-A 2-B

Fig. (2-A-B) Changes in the neurosecretory cells from visceral ganglia of *Laevecaulisalte* due to pesticides, Endosulfan during pre – reproductive period.
A – control ; B – Experimental group (x 100)
(a – pyriform cells; ax – axon; b- oval cells; n – nucleus; nu – nucleolus;
nsm – neurosecretory material)

Visceral : The neurosecretory material accumulated along the periphery of the nuclei, being more in type 'a' cells. Nuclei and nucleoli stained prominently. In type 'b' cells the secretory material was scattered in the cytoplasm in many cells.

3-A 3-B

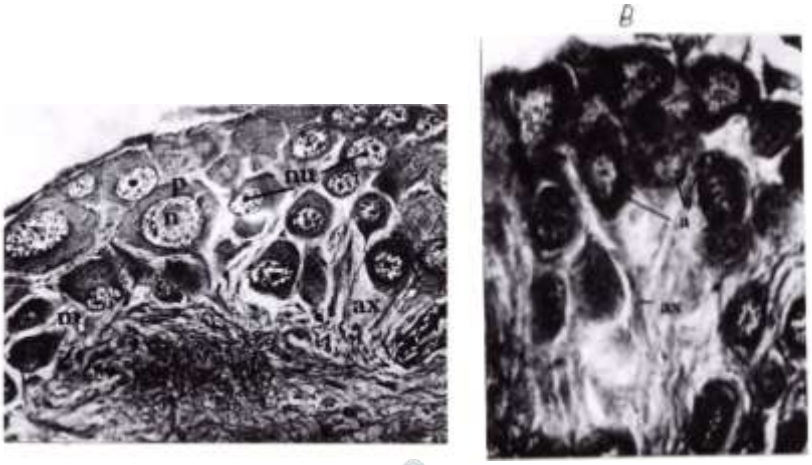

Fig. (3-A-B) Changes in the neurosecretory cells from pedal ganglia of *Laevecaulisalte* due to pesticides, Endosulfan during pre – reproductive period.
A – control ; B – Experimental group (x 100)
(a – pyriform cells; ax – axon; b- oval cells; n – nucleus; nu – nucleolus;nsm – neurosecretory material; p - perikaryon)

Pedal: The neurosecretory material was less vacuoles appeared, however, traces of material were recorded around the nuclei in both the types of cells (Fig. 3-A).

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