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Effect of Nuvan on Ovarian Histopathology of *Heteropneustes fossilis* (Bloch)

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ABSTRACT

Organophosphates are used in agriculture as insecticides and pesticides due to their rapid biodegradibility nature to control pest but their broad spectrum of harmful effects extends far beyond the pest. Main objective of this paper is to carryout an empirical study to investigate the effect of sub-lethal Nuvan on ovary of the *Heteropneustes fossilis*. LC_{50} value of Nuvan was calculated and LC_{50} for 96 h is found to be 0.98 ppm. For this study, the experimental group was treated with sub-lethal Nuvan concentraction of 1.43 ppm. Histopathological tissues were collected from both control group and experimental group following 30 days exposure of Nuvan.

Keywords Organophosphates , Nuvan, $LC_{50,}$ Ovary, Histopathology.

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INTRODUCTION

Pesticides the biological active chemicals are used to a great extent for the pest control but their spectrum of activity extends far beyond the pest. The magnitude of pesticide pollution was studied in the Indian fish by various workers (Naveed et al. 2010, Alam and Dubey 2015a, Alam et al. 2015b, Kesharwani et al. 2018). Nuvan, an organophosphate pesticide is being extensively used to control wide variety of insect pests under different conditions. Like other pesticides, lethal and sub-lethal treatment of Nuvan exerts various toxic effects on fish. Detectable gill injury in the fresh water fish *Puntius ticto* exposed to 30% EC of rogor have been observed earlier. The histopathological observation exposer to lethal concentration of Nuvan caused destructive effect in the gill, kidney and liver tissues of *L. rohita* observed by Kesharwani et al. (2018).

Exposure to Malathion for 7 days on *Ophiocephalus punctatus* at a concentration of 10, 12,14, 16, 18, 20 w/l and 100 ppm under laboratory conditions reported severe histopathological changes in brain, liver, ovary and tissues of the fish. (Pugazhvendan et al. 2009). However, the reports on the effects of Nuvan in Indian cat fish are still scarce. In the light of above information and ideas, the present investigation is aimed to study the effect of Nuvan on ovarian histopathology of *H.fossilis*.

MATERIALS AND METHODS

In the present study healthy and mature *Heteropneustes fossilis* of average weight (12 to 15g) were procured from local market and kept in aquarium in laboratory. They were acclimatized for 15 days in experimental water in lab condition before experiment. Fishes were starved 24 h prior to the experiment and not fed during experiment. The organophosphate pesticide Nuvan was procured from local market. Sub-lethal concentration of 1.43 ppm $C^{1}/_{4}^{th}$ of 96 h LC_{50}. In this experiment the specimens were kept in two experimental groups control group freed from treatment and experimental group is treated with Nuvan of sub-lethal concentration of 1.43 ppm. Histological tissues were collected from both groups

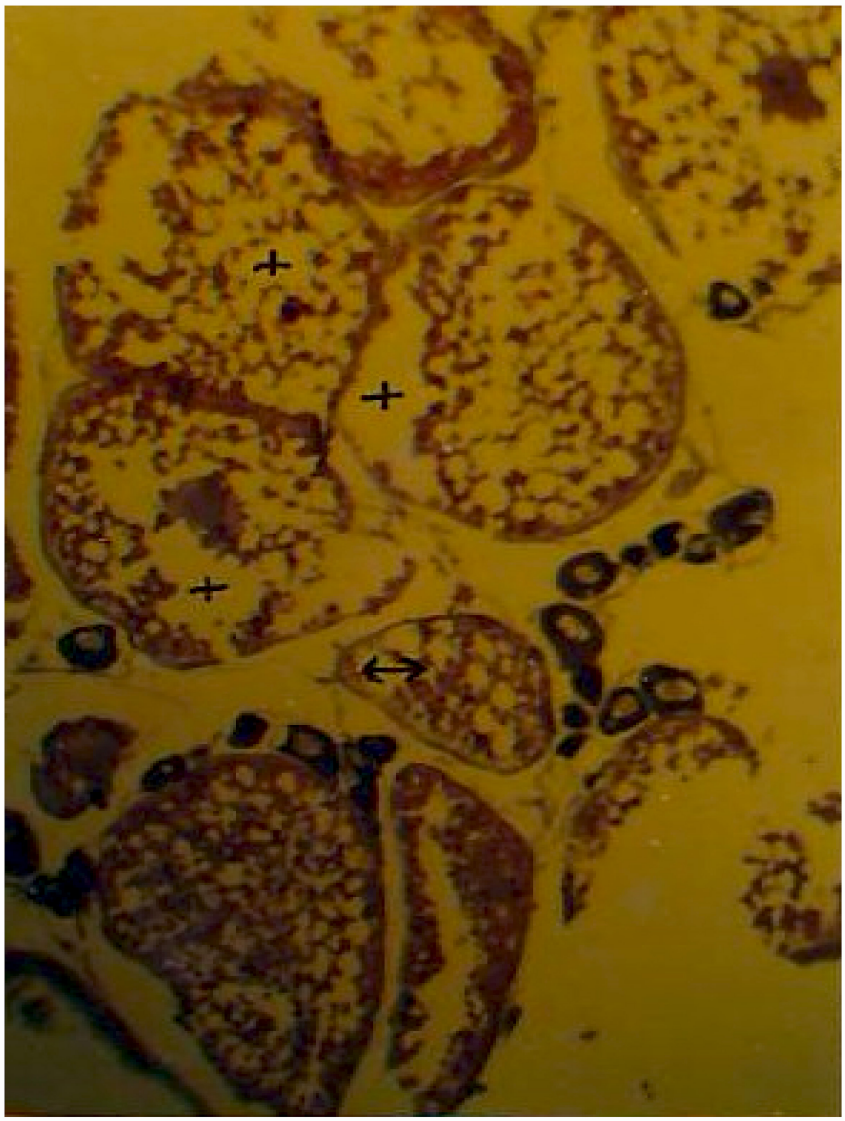

Fig. 1. Structure of ovary of normal fish showing Oogenetic stages with abundance of stage III (← →) and IV Oocytes (+) (x 100; H and E).

upto 30 days for study. The technique of microtomy is being used for histological purpose.

RESULTS AND DISCUSSION

In the present study ovarian profile of GSI (Gonado Somatic Index) was observed to be significantly reduced in experimental fish, thus, denoting retarded ovarian growth under the toxic influence of the insecticide. The maturing and mature oocytes (Stage III and IV oocytes) failed to develop and the number of atretic oocytes increase with respect to the control fish (Figs. 1 and 2). The inter-follicular oedema was apparent and the peritoneal covering thickened due to accumulation of fibrous tissue. The above mentioned pathological changes detected during this investigation denote that the organophosphate Nuvan even at sub-lethal dose severely affect the oogenetic process

Fig. 2. Insecticide exposed fish ovary with no stage III (maturing) and stage IV (mature) oocytes denoting arrest of vitellogenesis, abudance of stage I oocytes and fewer number of stage II oocytes , increased follicular space and enter-follicular oedema (x 100; H and E).

in *H. fossilis* as evident from the arrest of the reduced gonadosomatic indices.

Similar result has also been obtained by Prasad and Kumar (2013) while working on Macrones bleekeri and Mystus vittatus respectively. Information given by some other research workers like Alam and Sadhu (2010), Velmurugan (2012), Farooq et al. (2012), Vijaya and Alam (2013) on degenerative changes in the vital organs in fishes due to pesticidal action are on also record and the present findings are in agreement with those of other workers. The chronic effect of the pesticide, Nuvan was also observed on the ovarian cycle of the test fish. Decrease in GSI due to pesticide effect has also been observed by Alam (2009), Verma and Chand (2014), Singh et al. (2014), Pathak et al. (2016). In the present investigation, the possible reason behind the decrease in GSI may be due to less secretion of endogenous gonadotropins caused due to the action of the ingredients of pesticide.

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