Effect of organochlorine pesticide endosulfan on blood plasma of fresh water teleost, *Anabas testudineus*

V.S. BINDU AND P.R. GEETHA

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See end of the article for authors' affiliations

Correspondence to :
V.S. BINDU
P.G. Department of Zoology and Research Centre, Mahatma Gandhi College, THIRUVANANTHAPURAM (KERALA) INDIA

SUMMARY

Endosulfan is an organochlorine pesticide which is less persistent in the environment but more toxic to fish than other organochlorines. An acute static renewal test was conducted to determine the LC_{50} concentrations of endosulfan for 24, 48, 72 and 96h. For stress response study, the healthy male fishes were exposed to 7 ppb (LC_{10} 96 hour) of endosulfan for 48 hours and sampling were made at different time intervals of 0, (control) 2, 12, 14, 20, 24, 36 and 46 hours and recovery for a period of 48 hour (sampled at 2,12 and 48 hours) were studied after transferring the 48 hour exposed animal to toxicant free water. Several new bands which were not present in the control plasma were detected at different time intervals (20, 24, 36, and 46 hour) in the treated plasma and these bands had tendency to disappear during the recovery phase (2, 12 and 48 hour) and were comparable to the known protein bands in the molecular weight markers. Since these bands appeared during exposure period and disappeared in recovery phase, it seemed to be stress induced.

Key words : Endosulfan, LC50, Stress response, *Anabas testudineus*

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The environmental stress and physiological adaptations go hand in hand and the success of the organisms mostly depends upon how best it can adapt and cope up with the changed environmental conditions. There are many definitions of stress in fish. According to Brett (1958) "the stress is a state produced by an environmental or other factor which extends the adaptive responses of an animal beyond the normal range or which disturbs the normal functioning to such an extent that in either case, the chances of survival are significantly reduced". However, it is seen that when the physiological and/or psychological range and patterns are extended beyond their normal range, the organisms are subjected to a state of stress. Normally pollutants are the common environmental stressors, which can produce alterations in the normal physiology of the organisms. According to Hans Selye (1973) stress is "the nonspecific response of the body to any demand made upon it". Quite simply, stress can be considered as a state of threatened homeostasis that is re-established by a complex suite of adaptive responses (Chrousos, 1998). The stress, depending on its magnitude and duration, may affect fish at all levels of organization, from molecular and biochemical to population and community (Adams, 1990). Hence, the present attempt was under taken to study the stress response induced by endosulfan on plasma proteins of *Anabas testudineus*.

MATERIALS AND METHODS

Live specimen of adult fresh water fish, *Anabas testudineus* were collected locally. The fish weighing 45–50 g with the length of 14-15 cm were brought to the laboratory and acclimatised to the laboratory conditions for 15 days in large glass aquaria. All experimental glass aquaria were cleaned and filled with 40 L of seasoned (chlorine-free) tap water prior to the experiment. The test solution was prepared from the commercial endosulfan (35 EC). An acute static renewal test was conducted to determine the 24, 48, 72 and 96h LC_{50} concentration of endosulfan. Three replicates each containing eight fish were exposed to each concentration (3, 5, 7, 9, 14, 16, 18, 20, 25, 28, 31, 35, 38 and 40 ppb) of endosulfan. A blank solution (00 ppb) in three replicates each of eight fish was used as control. The media (control and test solution) in the aquaria were renewed daily (Bindu and Geetha, 2008).

For stress response study, the healthy male fishes of body weight 40-50g were selected from the holding tanks and segregate to three batches and simultaneously exposed to 7 ppb (LC_{10} 96 hour) of endosulfan. The experiment was run for the period of 48 hours and sampling were made at different time interval of 0, (control) 2, 12, 14, 20, 24, 36 and 46 hour and recovery for a period of 48 hour (sampled at