

Study on the effect of benzene exposure on the enzymatic activities in the tissues of *Gafrarium divaricatum* (Gmelin)

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ABSTRACT

This research paper reports on the study of effects of benzene exposure on enzymatic activities such as LDH, ACP, ALP, AAT, ALAT and ATPase activities in hepatopancreas, gill, and adductor muscle of *Gafrarium divaricatum*. Benzene, a known carcinogen and a source of some of the pathogenic conditions such as bone marrow depression aplasia etc., but its chronic toxicity is yet to be established among lower animals. The results observed that sub-lethal dose (4.75 mg/l and 8.7 mg/l) exposure of benzene for short duration (4 days) and long duration (30 days) caused stressed conditions in *G. divaricatum* affecting the enzyme activities.

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The invertebrates of intertidal zone are known to face sudden and harsh fluctuations. Gred Gäde (1983) proposed that when environmental anaerobiosis is forced on the animals, they face anoxic conditions. These conditions are also experienced due to external physical factors in the microhabitat. There are fairly good chances that because of reduction of over all metabolisms in bivalves, the utilization and production rate of substrates and the respective end-product are likely to be low. These activities are generally faster in crustacean which do not reduce their metabolism. Livingstone (1991) investigated the effects of organic xenobiotic, polynuclear aromatic and other hydrocarbons on bivalves and gastropods. Pitwillmer *et al.* (2000) have studied the effects of various pollutants, pathogenesis, environmental and climatic fluctuations on the intertidal animals. Benzene is reported to be carcinogenic and is used freely in the manufacture of medicinal chemicals, dyes, and other organic compounds, artificial leather, linoleum, oilcloth, air plane drapes, varnishes lacquer, as solvent for waxes, resins and oils. It is also known to cause irritation of mucous membrane, restlessness, convulsions, excitement, depression and it also causes failure of respiration among invertebrates (Tendulkar, 1996).

In spite of fairly good literature on the study on pollution, climatic fluctuations, the biochemical aspects at metabolic level, there appears to exist lacuna regarding

enzymatic response of bivalves. Therefore, it was considered to undertake some aspects of enzyme studies in *Gafrarium divaricatum*, found in the region of Narimen Point located at Mumbai coast.

MATERIALS AND METHODS

The intertidal clam, *Gafrarium divaricatum*, were collected during low tide from Narimen Point area off Mumbai coast. The specimens were washed and cleaned off any encrusted matter. On arrival at laboratory, these clams were acclimated for 24 hours in a medium sized aquarium containing sea water with salinity 30‰ to 32‰, temperature 27°C to 29°C and pH 7.7 to 8.0. These conditions were also maintained during the course of this investigation. Live clams having 30 × 32 mm size were subjected to bioassay.

Ten clams to be exposed to benzene were kept in thoroughly clean glass aquaria (20×15×15 cm) each containing one litre of sea water. The sea water was replaced periodically. Standard solutions of benzene were prepared in acetone. Aliquots of stalk solution were added to the experimental aquaria. Set of control clams were maintained during the course of the investigation. At the end of the exposure duration, the specimens were dissected open to expose the tissues to be studied such as hepatopancreas, gills, and adductor muscles. 100 mg of each of these tissues were blotted and homogenized using two volumes of chilled distilled water. These were centrifuged at 10000 rpm for 10 minutes. The clear supernatants were subjected to the respective enzyme assay. Simultaneously protein contents were estimated from the same supernatants and bovine serum albumin

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