Short Communication (NS-I)

GENOTOXICITY ASSESSMENT USING MICRONUCLEUS ASSAYS IN *Sperata seenghala* at in-situ LEVEL FROM LOWER LAKE AND SHAHPURA LAKE, BHOPAL, INDIA

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ABSTRACT

The present study was an attempt to explore the genotoxicity assessment in freshwater catfish, *Sperata seenghala* by micronucleus assay collected from Lower Lake and Shahpura Lake of Bhopal, India. The frequency of micronuclei was significantly higher in Shahpura Lake in comparison of Lower Lake. Total nuclei observed in Lower Lake were 44.00±0.811 and 56.00±0.944 in Shahpura Lake of which, the frequency of the micronucleus as 12.00±0.912 and nuclear abnormalities as 29.00±0.816 in Lower Lake, whereas, 16.00±1.414 and 30.75±0.577 were in Shahpura Lake. The results show that the assay can be employed for the evaluation and the assessment of water pollution and aquatic mutagens because *Sperata seenghala* fish is sensitive for bio-monitoring of genotoxicity as well as being an abundant species, easily may be kept with a wide distribution along the Central India.

Key Words: *Mystus (Sperata) seenghala*, Water Pollution, Genotoxicity, Micronucleus Assays (MN), Nuclear Aberrations (NA)

INTRODUCTION

Aquatic pollutants produce multiple consequences on organism, population, community and ecosystem level, affecting organ function, reproductive status, population size, species survival and thus biodiversity. Among these, carcinogenic and mutagenic compounds are the most dangerous as their effects may exert a damage beyond that of individual and may be active through several generations. The application of genotoxicity biomarkers in sentinel organisms allows for the assessment of mutagenic hazards and/or for the identification of the sources and the fate of the contaminants. Micronucleus (MN) test as an index of accumulated genetic damage during the lifespan of the cells is one of the most suitable techniques to identify integrated response to the complex mixture of contaminants.¹

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Studies in the Bhopal city has suggested contamination with poisonous and genotoxic substances such as trace metals, polycyclic aromatic hydrocarbons, polycyclic aliphatic hydrocarbons and pesticides.² Nowadays, effluents from industrial and urban wastes are responsible for considerable pollution problems. Among the various mutagen tests used for biomonitoring contaminated environments e.g., the comet assay,³ nuclear aberrations⁴ and chromosomal aberrations⁵, reliable and sensitive and has been used to evaluate the effects of mutagenic compounds in many different environments⁶.

In view of the above, an attempt has been made to perform the detection of genotoxicity using micronucleus and nuclear abnormalities assays in *Sperata seenghala* of polluted sites of Lower Lake and Shahpura Lake, Bhopal and its further use as a suitable biomarker for environmental biomonitoring using fish as bioindicator. (Fig. 1)
MATERIAL AND METHODS

We selected two sites viz: Lower Lake and Shahpura Lake, Bhopal for the present investigation, because both lakes are surrounded by dense human population with high anthropogenic activities and most of the untreated wastes are disposed in these lakes. Five fish samples of *S. seenghala* from each location such as Lower Lake and Shahpura Lake were collected. Peripheral blood samples were obtained from the caudal vein of the specimens and liver tissues were also collected from freshly dead fishes and the tissues were homogenized\(^7\). Marked a thin smear on pre-cleaned slides with the help of glass slides. Air dried all slides for 24 h in dust and moisture free environment at room temperature. All slides were fixed by dipping it into absolute methanol for 5-10 min. Air dried the slides for 1 h and stained them with Maygrunnwalds stain solution-I for 2-3 min and after that slides were washed with double distilled water and dried. Shortly after, they were stained with Maygrunnwalds stain solution-II for 3-6 min and again washed with double distilled water and dried. All the slides were stained with Giemsa stained (6-10%) in phosphate buffer for 30 minutes and washed with double distilled water to remove all Giemsa particles. The prepared slides were Permanently fixed with DPX mount and dried overnight. Only the slides had that were clearly visible cells and isolated under microscope Carl Zeiss (Germany) with magnification 100X, were counted. Micronucleus were considered as small inclusions of nuclear materials inside erythrocyte cytoplasm., criteria for identification were a round or oval shape with a flat and well defined outline, coloration similar to that of the main nucleus.

RESULTS AND DISCUSSION

Order to differentiate between nuclear damage due to genotoxicity and was assessed using the micronucleus and nuclear abnormalities assays. Present investigation showing the average frequencies of micronucleus and nuclear abnormalities in the fishes of both water bodies. The frequency of micronuclei was significantly higher in Shahpura Lake in comparison to Lower Lake. The total nuclei observed in lower lake were 44.00±0.811 while in Shahpura Lake were 56.00±0.944. However, the frequency of the micronucleus and nuclear abnormalities were 12.00±0.912 and 29.00±0.816 respectively in

![Fig. 1: Micronucleated (MN) erythrocytes of *Sperata seenghala*](image-url)
Finally, from this prelude studies, it can be concluded that the micronucleus test as applied to the freshwater fish *Sperata seenghala* showed to be very efficient in determining genotoxicity in impacted freshwater habitats due to this fish is sensitive for bio-monitoring, as well as being an abundant tropical species, easily may be kept with a wide distribution along the Central India.

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