Isozyme Variation and Phylogenetic Relationships in Representative of Family Portunidae from The Coastal Waters of Pakistan

Farah Naz[1]*, Noor Us Saher[2], Mustafa Kamal[3]
[1]Institute of Marine Science, University of Karachi
[2]Centre of Excellence in Marine Biology, University of Karachi
[3]Department of Biotechnology, University of Karachi
*E-mail: farahasjil@yahoo.com

ABSTRACT

In the recent time molecular markers have been used as a key tool to resolve taxon problems in field of taxonomy and systematic, therefore also valuable to fishery biologist. An enzyme polymorphism is also used and considered as molecular markers in many genetic, phylogenetic and population studies commonly exhibit genetic variations within any species. The current study provides the applicability and significance of Isozyme as markers for the commercially important crab belongs to family Portunidae.

Keywords: Portunid crabs, General protein, isozyme, genetic divergence, Pakistan.

INTRODUCTION

The high resolution Polyacrylamide gel electrophoresis (PAGE) account for a technique that utilized in Molecular Biological studies to separate and characterize the macromolecule of nucleic acid and Protein. This technique measures the validity of recognized species according to the genetic identity and also means for identifying related species (Zhongbao *et al*., 2004). Similarly Isozyme electrophoresis also considered as a biochemical technique to the determination of genetic dissimilarity between and among the species and inter or intraspecific genetic divergence in populations Kumar *et al*., (2010). Previously molecular taxonomic studies have been focused on the electrophoresis technique to identify and resolved the species complex issues within the species i.e. *Callinectus sapidus*, in *Scylla* complex by Keenan *et al*., (1998); for *Chionoecetes opilio* and *C. bairdi* by Merkouris and Seeb, (1997). Representative of swimming crab found in Pakistan and being subject to high exploitation pressure despite of this no previous studies has been done according to the molecular perspective. The current study emphasis to the resolve the status of present species and also evaluate their genetic diversity within and among the species and provides the means for sustainable management of the species.

OBJECTIVES

To observe the inter and intra specific isozyme variations in Portunid swimming crab species by using SDS-PAGE and Native-PAGE electrophoresis.

MATERIAL AND METHODS

The fresh crabs (14 species) samples were procured from the coastal fishing spots; store up in ice and transferred to the laboratory. Initially samples froze at -20°C for the muscles tissues extraction. The various steps (extraction, separation & staining) were performed for the SDS PAGE (general protein) and Native

PAGE (isozyme) by following Shaw and Parasad, (1970). of protein relative mobility (Rm) was estimated through Petrokas, (2008). The genetic heterogeneity were estimated with reference to Shannon's index (I), heterozygosity (H), % polymorphic loci (PPL) observed and effected alleles (Na, Ne) number, genetic distance (D), identity (I) and similarity coefficients determined by UPGMA all phylogenetic analysis all data were computed by using the software population genetic analysis POPGENE version 1.32.

RESULTS

About 31 isozymic loci were resolved in 14 swimming species of crabs and *T. danae* was represent highest polymorphic loci and *T. savignyi* represented minimum no of loci. Highest heterozygosity was observed in *C. feriata* as compared to others *Charybdis* species. *Thalamita* and *Charybdis* were closely related to each other as observed in their lowest values of genetic diversity in comparision with other remaining genera i.e. between *Portunus* and *Scylla*. The cluster analysis mean results as obtained through UPGMA (Unweighted Pair-Group Method) revealed that the all fourteen species alienated into three separate clusters. The genus *Charybdis* composed the first cluster, whereas genus *Thalamita* formed another cluster further more genus *Scylla* and *Portunus* along with *T. danae* cluster together.

CONCLUSION

Inter and intraspecific genetic variations and phylogenetic relationships was observed by using Native- and sodium do decyl sulfate-polyacrylamide gel electrophoresis in representative of family Portunidae found along the coast of Pakistan.

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REFERENCES

1. Keenan, C. P., Davie, P. J. F., and Mann, D. L. A revision of the genus Scylla DE HAAN, 1833 (Crustacea: Decapoda: Brachyura: Portunidae). Raffles Bulletin of Zoology, 46 (1998): 217-245.
2. Kumar, B.H., Udaya Shankar, A.C., Chandra Nayaka, S., Ramachandra Kini, K., Shetty, H.S. and Prakash, H.S.. Biochemical characterization of Fusarium oxysporum f. sp. Cubense isolates from India. African Journal of Biotechnology, 9, (2010): 523-530.
3. Merkouris, S.E., and Seeb, L.W. Low level of genetic diversity in highly exploited populationsof Alaskan Tanner crabs, Chionoecetes bairdi, and Alaskan and Atlantic snow crabs, C. Opilio. Fishery Bulletin, 96, (1998): 525-537.
4. Petrokas, R., and Stanys, V. Leaf peroxidase isozyme polymorphism of wild apple. Agronomy Research, 6, (2008): 531-541.
5. Shaw, C.R., Prasad, R., Starch gel electrophoresis of enzymes: a compilation of recipes. Biochemical Genetics, 4, (1970): 297-320.
6. Zhongbao, L., Shaojing, L., Guizhong, W. Genetic diversity and differentiation of mud crab Scylla serrata populations from southeastern China. Acta Oceanologica Sinica,23 (2004): 309-316.