Original Research Paper

Volume - 12 | Issue - 01 | January - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Agricultural Science

SEASONAL VARIATION IN OXIDATIVE STRESS PARAMETERS IN KIDNEY OF *DUTTAPHRYNUS MELANOSTICTUS*

Pragati Priyambada Pattanayak* P.G. Department of Zoology, Maharaja Sriram Chandra Bhanja Deo University, Baripada-757003, Odisha, India. *Corresponding Author

Puspanjali Parida P.G. Department of Zoology, Maharaja Sriram Chandra Bhanja Deo University, Baripada-757003, Odisha, India.

ABSTRACT Duration of season may vary from one geographical area to other, which can influence physiology of inhabiting organisms. The purpose of this present study is to observe seasonal variation in oxidative stress parameters such as protein, lipid peroxidation (LPX), reduced glutathione (GSH), ascorbic acid (ASA) and total lipid content in kidney of adult *Duttaphrynus melanostictus*. Result of the present study showed that LPX, ASA and total lipid content were highest in rainy season and lowest in winter season. GSH content was highest in rainy season and lowest in summer season. Protein content was highest in winter and lowest in rainy season.

KEYWORDS : Oxidative stress parameters, seasonal variation, Duttaphrynus melanostictus

INTRODUCTION

Amphibians are important link between human and ecosystem health (Hayes *et al,* 2002) and are main components of aquatic and terrestrial ecosystems. The use of a few common species or groups of species as model systems is an established research tool in ecology (Scheiner and Gurevitch, 2001). Physiological responses observed in amphibians like hibernation, aestivation, reproduction, behaviour, susceptibility to diseases are influenced by day length and temperature (Keith, 2002). In amphibia, aestivation is accompanied by a reduction of oxygen consumption during drought. *Duttaphrynus melanostictus* shows an endogenous seasonal pattern of thermoregulation and control the ventilation to counteract hypoxia (Bicego-Nahas *et al,* 2001).

MATERIALS AND METHODS

Adult *Duttaphrynus melanostictus* with a mean body weight of about 100-120g were captured by hand net from in and around Baripada, Odisha, India. The animals were acclimatized in laboratory condition for 7 days prior to experiment. The animals were sacrificed kidney was collected immediately. Then kidney was homogenized and supernatant was collected after centrifugation. Protein estimation was done according to Lowry *et al* (1951). Estimation of LPX and GSH was done by the method of Okhawa *et al* (1979) and Ellman (1959), respectively. Ascorbic acid estimation was done according to the method of Jagota and Dani (1982). Estimation of total lipid content was measured according to the method of Folch *et al* (1957).

RESULT AND DISCUSSION

In amphibians, as in higher vertebrates, kidney fulfils an important function in maintaining a stable internal environment in terms of a highly variable external environment. Oxidative stress results in protein degradation, enzymatic inactivation, lipid peroxidation and other degenerative eevents which ultimately leads to cell death (Katoch *et al*.,2002).

Protein content

Protein content were found to be 34.08$\pm$4.8813, 33.744$\pm$2.39335, 40.251$\pm$3.097 mg/g tissue in summer, rainy and winter respectively. There is a significant variation [F (2, 27) = 8.464, P = 0.000] observed in adult *D. melanostictus*. It is revealed that protein content in kidney found to be highest in winter and lowest in rainy.

Lipid peroxidation

Membrane lipids, specifically polyunsaturated fatty acids are more prone to reactive oxygen species attack, which is known as lipid peroxidation (Elstner, 1991). Lipid peroxidation is another biomarker of oxidative stress and is one of the most investigated consequences of reactive oxygen species on lipid membranes LPX level were found to be 5.80851$\pm$0.94468, 7.13139$\pm$1.618759, 2.92882$\pm$ 0.790734 n mole TBA RS/mg protein in summer, rainy and winter respectively. A significant variation [F (2, 27) = 33.475, P = 0.000] observed in LPX content of kidney of adult *D. melanostictus.* It is revealed that LPX content was found to be highest in rainy and lowest in winter.

Reduced glutathione

GSH content were found to be 0.0262 $\pm$ 0.0058, 0.04513 $\pm$ 0.0073, 0.0231 $\pm$ 0.0072 during summer, rainy and winter season respectively.A significant variation [F (2, 27) = 30.081, P = 0.000] observed in GSH content of kidney of adult *D. melanostictus.* It is revealed that GSH content was found to be highest in rainy and lowest in summer.

Ascorbic acid

Antioxidant activity of vitamin C or ascorbic acid makes it a hunter for free radicals, thus preventing the autointoxication of immunological cells and it will maximize the defensive capacity of animal (Brake, 1997).

Ascorbic acid content were found to be 1.30228$\pm$0.323914, 1.01984$\pm$ 0.350018, 0.900742 $\pm$ 0.266413 during summer, rainy and winter season respectively.A significant variation [F (2, 27) = 4.290, P = 0.024] observed in ascorbic acid content of liver of adult *D. melanostictus.* It is revealed that ascorbic acid content in liver found to be highest in rainy and lowest in winter.

Total lipid content

Total lipid content were found to be 4.65062 $\pm$ 0.41962, 5.63478 $\pm$ 0.31105, 3.53646 $\pm$ 0.28851 percent during summer, rainy and winter season respectively.A significant variation [F (2, 27) = 92.856, P = 0.000] observed in total lipid content of liver of adult *D. melanostictus.* It is revealed that total lipid content in kidney found to be highest in rainy and lowest in winter.

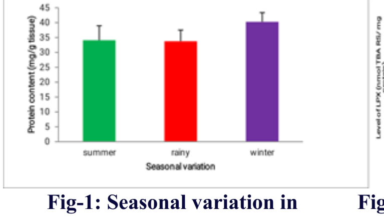

Fig-1: Seasonal variation in protein content

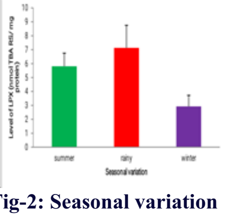

Fig-2: Seasonal variation in Level of LPX

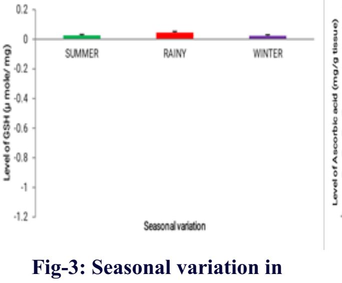

Fig-3: Seasonal variation in GSH

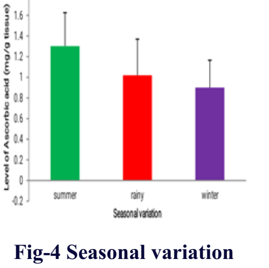

Fig-4 Seasonal variation in ascorbic acid

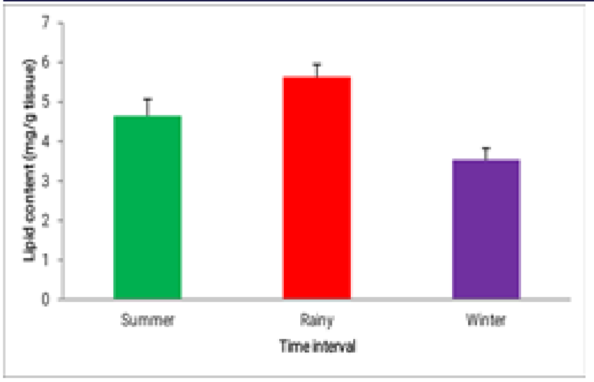

Fig- 5: Seasonal variation in total lipid content

CONCLUSION

In the present study seasonal variation in oxidative stress parameter is significantly interpreted before they are used as a model for ecotoxicological assessment. This is especially needed as populations fluctuates naturally with environmental conditions or due to any other causes.

REFERENCES

1. Bicego-Nahas, K. C.; Gargalioni, L. H.; Branco, L. G. S. (2001) Seasonal changes in the preferred body temperature, cardiovascular and respiratory responses to hypoxia in the toad, Bufo paracnemis. Journal of Experimental Zoology 289: 359-365.
2. Brake, I. (1997) Immune status roles of Vitamins. Feed Mix 5(1): 21-24.
3. Ellman, G. D. (1959) Tissue sulfhydryl groups. Archives of Biochemistry and Biophysics 82:70.
4. Elstner (1991) Oxygen radicals- Biochemical basis for their efficacy. Klinische Wochenschrift 69: 949-956.
5. Folch, J.; Lees, M. and Sloane Stanley, G. H. (1957) A simple method for isolation and purification of total lipids from animal tissue. Journal of Biological Chemistry 226: 497-509.
6. Hayes, T. B.; Collins, A.; Lee, M.; Mendoza, M. (2002) Hermaphroditic Demasculinized frogs after exposure to herbicide at low ecologically relevant doses.
7. Jagota, S. K. and Dani, H. M. (1982) A new colorimetric technique for the estimation of Vitamin C using Colin Phenol Reagent. Analytical Biochemistry, 127: 178-182.
8. Keith, M.N.B. (2002) In: The Physiological Ecology of vertebrates. A view from Energetic Cornell University Press, Ithaca, Newyork, USA.
9. Lowry, O. H.; Resbrough, N. J.; Farr, A. L. and Randolph, R. J. (1951) Protein Measurement with the Folin Phenol Reagent. Journal of Biological Chemistry 19: 265-275.
10. Okhawa, H.; Ohishi, N. and Yagi, K.(1979) Assay of LPX in animal tissues by this barbituric acid reaction. Analytical Biochemistry and Physiology 118C(1): 33-37.
11. Scheiner, S. and Gurevitch, J. (2001) In : The design and analysis of Ecological Experiments. Oxford University Press. 2nd Edition.