



## DETERMINATION OF GLUTAMATE DEHYDROGENASE IN *ASCARIDIA GALLI*, PARASITIZING *GALLUS GALLUS DOMESTICUS*

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### Abstract

Glutamate formed by the action of the transaminases and may undergo rapid oxidative deamination catalysed by the pyridine linked glutamate dehydrogenase. Biosynthesis of GDH takes place on microsomes and then it is transported, possibly by phospholipids in to mitochondria. Some literature citations are available with the study of GDH activity. Pollak and Fairbairn, (1955), Perez-Gimenez, *et al*, (1967), Langer, (1972) and Rhodes and Ferguson, (1973). The present investigation carried out the study of GDH activity in nematode parasite *Ascaridia galli* (Schrank, 1788), Freeborn, 1923 of naturally infected *Gallus gallus domesticus*. In this studies estimated data represent respectively in male and female is  $1.52 \pm 0.25$  and  $2.11 \pm 0.744$   $\mu\text{moles/hour}/100$  mg tissue, indicate that activity exceeds in females than males.

**Keywords:** *Ascaridia galli*, GDH, *Gallus gallus domesticus*, Estimation, Nanded region

### Introduction

In protein metabolism, glutamate dehydrogenase enzyme plays a vital role in amino acid catabolism, particularly in deamination reaction. It splits up the protein molecules in to discrete units. The location of glutamate dehydrogenase (GDH) in the mitochondria of animal cells. The enzyme has two sub-units with equal molecular weight. Protein molecules are made up from chain of amino acids. These amino acids of an organism undergo many varied and complicated reactions. Among these reactions the process of deamination and transamination are very important.

The initial reaction in the catabolism of many amino acids involved the removal of amino group, leaving an alpha-keto acid as the remaining product. The amino group is converted to urea or may also be stored as the amine group of glutamine or excreted as nitrogenous compounds. Deamination of glutamic acid is of great biological importance. L-glutamic acid plays a key role in the metabolism of amino acids. This being a reversible reaction, the GDH plays a dual role, both in catabolism and biosynthesis. Glutamate dehydrogenase provides a route for incorporation of nitrogen in to organic compounds and thus provides a link between carbohydrate and protein metabolism. There are three types of glutamate dehydrogenases which differ in co-enzyme specificity, those specific for either NAD or NADP and those that can function with both co-enzymes. It is generally considered that the enzyme linked to NAD is involved primarily in the oxidation of the glutamate, where as the one linked with NADP is responsible for biosynthesis.

### Material and Methods

The method of Lee and Lardy, (1965), as modified by Pramilla and Swami, (1975), was followed to determine the GDH (GDH: L-glutamate, NAD Oxidoreductase, EC 1.4.1.3) activity. The 4% (w/v) homogenates of the male and female worms were prepared in 2.25 M sucrose solution. Supernatants of the homogenates obtained by centrifugation at 2500 rpm for 15 minutes were used for enzyme assay. The reaction mixture in a final volume of 2.5 ml contained 50  $\mu\text{moles}$  of substrate (sodium glutamate), 100  $\mu\text{moles}$  of phosphate buffer (pH 7.4), 2  $\mu\text{moles}$  of INT and 0.1  $\mu\text{moles}$  of NAD. The above mixture was made upto 2 ml with distilled water. The reaction, in all the samples, was started by the addition of 0.5 ml of crude enzyme extract (equivalent to 20-25 mg worm tissue) after half an hour incubation of the samples at 37°C, the reaction was stopped by adding 5 ml of glacial acetic acid. The formazan formed was extracted overnight in 5 ml of toluene in cold. The colour intensity of the formazan, proportional to enzymatic activity was read at 495 nm against a toluene blank. The enzyme activity was expressed as  $\mu\text{moles}$  of formazan/hour/100 mg tissue.

### Results and Discussion

The quantitative evaluation of GDH are represented in graph from we can conclude that the GDH content in male and female  $1.57 \pm 0.25$  and  $2.11 \pm 0.45$   $\mu\text{moles/hour}/100$  mg tissue, respectively. The male to female ratio is 0.744  $\mu\text{moles/hour}/100$  mg

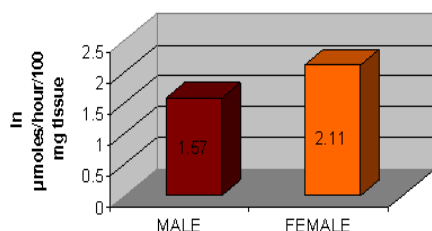
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tissue indicates that the activity in females exceeds that of male by about 25.59%.

Though, the glutamate dehydrogenase is an important enzyme but yet not much work has been done on nematodes. The presence of GDH suggests that the nematode parasite is capable of other metabolic pathways like protein degradation and transmission to gain energy during emergency. The high activities of GDH in *A.galli* suggest that this enzyme play an important role in protein metabolism.

Graph: glutamate dehydrogenase activity in male and female nematode parasites of *Ascaridia galli*



The role of GDH is the direction of catabolism of the amino acid is evidenced by the production of ammonia in *Ascaridia galli*, (Rogers, 1952). The presence of the high activity of GDH in these nematode parasites is indicative of its possible role in the catabolism of L-glutamate. This activity is of dual significance. As a result of GDH activity not only α-ketoglutarate is produced but also the reduced NADH is produced in equally considerable quantities. The larger activity level of GDH in female nematode parasites is explainable as per the observed larger content of protein and lipid.

Nematode parasite i.e. *Ascaridia galli* parasitizing with the *Gallus gallus domesticus* from Nanded region, (M.S.), India bears a fact that these worms are well adapted to their niche of intestinal mode of life. The infection produces or tends to produce over dispersion of parasites have high reproductive potential than the host, which results in the enormous growth of the parasite population ultimately leading to the death of the host.

The above work would be helpful in the drug designing and anti-parasitic agents against parasitic nematodes. The above study would also be helpful in understanding the identification of nematodes species. Metabolic diversity of species has extremely important relationship with virulence and hypersensitivity reactions in the host. The disease spectrum entirely depends on species.

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