International Journal of Advance Research in Science and Engineering
Volume No.07, Issue No.02, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

A STUDY ON THE ACTIVITY LEVELS OF SOME ENZYMES OF RAILLIETINA TETRAGONA (MOLIN, 1858), INFECTING DOMESTIC CHICK, GALLUS GALLUS

Achaiah.N[1]*, Vijaya Kumar[2]. N

[1]Dept of Zoology, Kakatiya University, Warangal, A.P, (India)
[2]Professor (Retd), Dept of Zoology, Kakatiya University, Warangal, A.P, (India)

ABSTRACT

The present study was performed to investigate the transition in LDH, SDH, GDH and MDH levels in relation to the differentiation of proglottids of Raillietina tetragona, infecting domestic chick. LDH levels in immature, mature and gravid regions is 0.139 ± 0.027, 0.121 ± 0.250 and 0.106 ± 0.206, SDH activity in immature mature and gravid regions is found to be 0.172 ± 0.000, 0.144 ± 0.019 and 0.094 ± 0.001 respectively. GDH activity levels are 0.121 ± 0.027, 0.086 ± 0.129 and 0.127 ± 0.027, and MDH levels were 0.152 ± 0.021, 0.135 ± 0.012 and 0.085 ± 0.018 µmoles of formazan/mg protein /hr. respectively in immature, mature and gravid proglottids. The data obtained from immature, mature and gravid segments of adult worm revealed that there exists a gradient in different proglottids and the data was statistically analysed by ANOVA.

KEYWORDS: ANOVA, differentiation of proglottids, GDH, LDH, MDH, Raillietina tetragona, and SDH.

I.INTRODUCTION

The cestodes are endoparasitic helminths which almost exclusively occupy the alimentary canal in preference to other common sites like bile duct, gallbladder or the pancreatic duct[1]. Helminthosis remains one of the world's most prevalent and economically significant parasitosis of man and domestic animals. This is particularly in case of developing countries, of tropical regions of the world, where the environmental and socio-economic conditions are highly conducive for development, maintenance and transmission of infection.

The metabolism of the cestodes depends on the feeding habits of the host. The elongated tape-like body of the cestodes enables it to live in its tubular habitat[2]. The present study was undertaken to know the regional distribution of LDH, SDH, GDH and MDH in developmentally related regions of the worm.

Raillietina tetragona is a poultry cestodes, parasitizes domestic fowl *Gallus gallus*. The parasites were collected from small intestines of naturally infected domestic chick from Warangal region of Telangana, India. Entire worms of same length were selected and biochemical analysis was performed. The immature, mature and gravid regions were located and separated for biochemical analysis. Immature proglottids containing scolex, neck and anterior region, mature region contains functional reproductively active segments and gravid region contains eggs only. Enzyme assays were performed after due standardization. Enzyme activities are expressed as µmoles of product formed or substrate cleaved for mg/hour.

In each region, inclusion of a few proglottids may not be ruled out. However this may not make significant differences as the aim of investigation is to find out whether there exists a pattern of difference in enzymatic activity along three different regions i.e. immature, mature and gravid regions.

SDH activity in immature, mature and gravid proglottids of *Hymenolepis diminuta* was studied[3]. GDH levels were reported by several workers[4-8] from *Haemonchus contortus*. and *Ascaris scuum*. LDH was reported from *Echinococcus granulosus, Hymenolepis microstoma*[9-11]. GDH partially purified from *Hymenolepis diminuta*[12]. GDH was reported from adult female *Ascaris scuum*[13]. MDH has been reported from *Fasciola hepatica*[14] and *Hymenolepis diminuta*.

II.MATERIAL AND METHODS

Lactate dehydrogenase and Succinate dehydrogenase activity was estimated according to Nachlas *et al* (1960) as modified by Pramilamma *et al* (1975)[15-16]. Glutamate dehydrogenase activity was estimated according to Lee and Lardy (1965) as modified by Pramilamma and Swami (1975)[17]. GDH activity was estimated by Nachlas *et al* (1960)[18].

III.RESULTS

The data pertaining to the LDH, SDH, GDH and MDH activity are summarised in the table No.1 and the histogram-1, the values are expressed in µmoles of formazan/mg protein/hour respectively. (Each value is a mean of six values with ±SE).

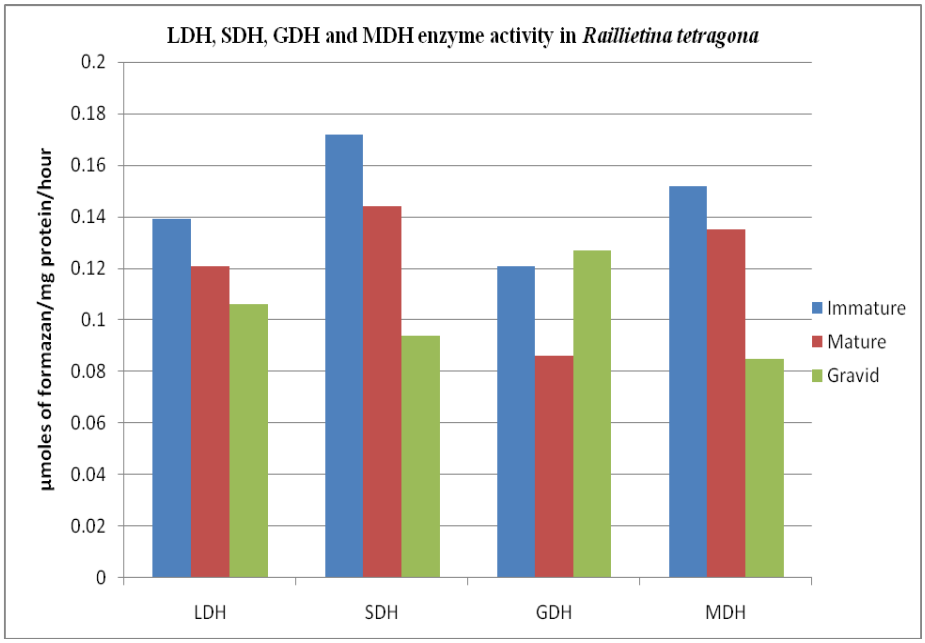
IV.FIGURES AND TABLES

Table No.1. LDH, SDH, GDH and MDH Activity Levels

Content	Immature	Mature	Gravid

LDH	0.139 ± 0.027	0.121 ± 0.250	0.106 ± 0.206
SDH	0.172 ± 0.000	0.144 ± 0.019	0.094 ± 0.001
GDH	0.121 ± 0.027	0.086 ± 0.129	0.127 ± 0.027
MDH	0.152 ± 0.021	0.135 ± 0.012	0.085 ± 0.018

Histogram.1. Showing the Activity Levels of LDH, SDH, GDH and MDH activity



V.DISCUSSION AND CONCLUSIONS:

SDH is the only dehydrogenase enzyme in Krebs cycle present in inner mitochondrial membrane, catalyses dehydrogenation of succinate to fumarate. FAD co-enzyme accepts electrons and transfers to respiratory chains for ATP synthesis.

From the review of existing literature it was found SDH activity was not reported from different regions of *Raillietina tetragona* relatively in three regions *viz*, immature, mature and gravid. SDH activity is more in immature followed by mature and gravid regions. Immature regions might be involved in high metabolic

activity as they are involved in strobilisation. LDH catalyses pyruvate, lactate inter-conversions depending on the demand of metabolic needs of organism.

In the present study, a gradient exists in different regions of the worm. Lowest activity was found in immature area and highest in the mature region. This reflects the differential metabolic activity, stages, growth and development along the strobila of the worm. Earlier studies in *Hymenolepis diminuta*[19] reported higher levels of LDH activity in immature and mature segments and correlated it with their very active metabolic reactions.

Variations in the enzymatic activities reflect differential metabolic rates occurring in proglottids at different stages of growth and development. LDH activity increases during conditions favouring anaerobic respiration to meet energy demands. The present data supports developmental and segmental differences in *Raillietina tetragona*. MDH produces malate from OAA by CO_2 fixation malate is reduced to succinate via fumarate, hence SDH levels are more than MDH and this is in reverse direction of TCA cycle.

GDH plays a role in ammonia production and catalyses synthesis and degradation of glutamic acid. It is vital, as it inter-converts glutamate to α-keto- glutarate and *vice versa*. It is linked to either $NADP^+$ or NAD^+. Very few reports are available on GDH activity. The results found are in agreement with earlier reports. The GDH activity is more in gravid region followed by immature and mature regions. The data obtained from immature, mature and gravid segments of adult worm revealed that there exists a gradient in different proglottids and it reflects the differential metabolic roles of the proglottids.

VI.ACKNOWLEDGEMENTS

The author acknowledges the financial support of Kakatiya University in the form of University Research Fellowship during research period (2009-2013).

REFERENCES

[1] McManus D P and Smyth (1978a): Intermediary carbohydrate metabolism *Echinococcus granulosus.* Parasite. 84:351-366.

[2] Smyth JD, McManus DP (1989): *the physiology and biochemistry of cestodes* Cambridge University Press, New York.

[3] Fioravanti *et al* (1998): Metabolic transition in the development of *Hymenolepis diminuta*. Parasitol Res 84: 777-782.

[4] Burke, Gracy, and Harris (1972): Studies on enzymes from parasitic helminths.III purification and properties of LDH from tapeworm *Hymenolepis diminuta*. Comp. Biochem. Physio. 43B:345-359.

[5] Langer, B.W. (Jr.) (1972): The glutamic acid dehydrogenase of adult female *Ascaris scum*. J. Parasitol. 58 (3), 539-540.

[6] Anderson et al (1977): Biochemical indications of liver injury in calves with Fasciolosis, Vet Record 100 (3):43-45.

[7] Saxena (1981): effect on host metabolism of *Litomosides carinii* infection in *Mastonys natalensis*. J. Communicable disease 13 (4): 266-272.

[8] Waitz (1963): Glycolysis enzymes of cestodes *Hydatidigera taeniaeformis*. J. Parasit. 49:285-293.

[9] McManus D P and Sterry (1982): *Ligula intestinalis*, intermediary carbohydrate metabolism in plerocercoids and adults. Zeitschriff fur parasitenkunde, 67:73-85.

[10] McManus D P and Smyth (1982): Intermediary carbohydrate metabolism *Echinococcus granulosus.* Parasite. 84:351-366.

[11] Pappas and Schroeder (1979): *Hymenolepis microstoma*, LDH, MDH of adult worm. Exptl. Parasit. 47: 134-139.

[12] Mustafa (1978): cytosolic GDH in adult *Himenolepis diminuta* (cestode). Comp. Biochem. and Physio. 61B:219-222.

[13] Langer, B.W. (Jr.) (1972): The glutamic acid dehydrogenase of adult female *Ascaris scum*. J. Parasitol. 58 (3), 539-540.

[14] Prichard (1968): A comparative study of TCA cycle enzymes in *Fasciola hepatica* and rat liver. Comp. Biochem. Physio. 25:1005-1009.

[15] Friedman and Haughen (1943) *in hawk's physiological chemistry* edited by Oser 1954, Mc Grawhill, New York.

[16] Friedman and Haughen (1943) *in hawk's physiological chemistry* edited by Oser 1954, Mc Grawhill, New York.

[17] Friedman and Haughen (1943) *in hawk's physiological chemistry* edited by Oser 1954, Mc Grawhill, New York.

[18] Friedman and Haughen (1943) *in hawk's physiological chemistry* edited by Oser 1954, Mc Grawhill, New York.

[19] Fioravanti *et al* (1998): Metabolic transition in the development of *Hymenolepis diminuta.* Parasitol Res 84: 777-782.