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Comparative Study of Rhodanese Activity in Some Tissues of a Day old and 12 Weeks old Domestic Fowl *(Gallus domesticus)*

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ABSTRACT: Rhodanese activity was assayed in the liver, kidney and heart of a day old and 12 weeks old domestic fowl (*G. domesticus*). The activity in these tissues differed significantly ($P < 0.05$). The order of activity of the enzyme was liver › heart › kidney. Rhodanese activity in the liver and heart of a day old domestic fowl was about twice the activity in the liver and heart respectively of 12 weeks old domestic fowl. Kidney of a day old and 12 weeks old domestic fowl showed no significant difference ($P < 0.05$) in rhodanese activity. The higher rhodanese activity in the liver of domestic fowl may not be unconnected to the role of this organ in cyanide detoxification. The higher activity in tissues of a day old compared to the 12 weeks old domestic fowl may suggest other possible role of rhodanese in these tissues, in addition to cyanide detoxification.

INTRODUCTION

Rhodanese (E.C.2.8.1.1 cyanide: thiosulphate sulphur transferase) is involved in cyanide detoxification (1,2) by catalyzing the formation of a less toxic thiocyanate from cyanide and thiosulphate or some other sulphur donors (1, 3) The activty of this enzyme has been demonstrated in various plant species (1,4), bacteria (5) fungi (6) and in organs and tissues of many animal species (7 - 10).

The primary physiological role of rhodanese in animal tissues is cyanide detoxification (1,2). However, the distribution of rhodanese is not restricted to those species that encounter exogenous cyanide through feeding on cyanogenic glycoside (7,11). This is an indication that cyanide detoxification may not be the only physiological role of this enzyme (11). It has been shown to participate in sulphur transfer in protein synthesis (3), involved in the formation of C-S bond of isothionase in squid (12). Ogata and Volini (13) proposed that rhodanese function as a converter enzyme that interact with rnitochondrial membrane bond iron-sulphur centres of the electron transport chain to modulate mitochondrial respiration (5,13). Its possible role in providing labile sulphide necessary for the synthesis of ferredoxin of the chloroplast of some plant species have been reported (2, 13).

This paper deals with a comparative study of rhodanese activity in tissues of a day old and 12 weeks old domestic fowl (*G. domesticus).*

MATERIALS AND METHODS

Chemicals:

All the chemicals and reagents used in this work are of analytical grade.

Animals:

A total of five each of 1 day old and 12 weeks old male domestic fowls were purchased from ECWA Farms, Jos - Nigeria.

Preparation of Tissue homogenates:

The animals were killed by decapitation and then dissected. The liver, kidney and the heart were quickly excised and washed off blood with ice-cold 0.9% NaCl (w/v). Ten percent homogenate of each of the tissue was made using the method of Ugochuckwu *et al.* (7).

Enzyme Assay:

Rhodanese activity in the tissue extracts was meauured at 460nm using CE373 Linear Read - Our Grating Spectrophotometer by the method of Sorbo (14). The enzyme activity was expressed as micromoles of thiocyanate formed per minute per gram (μmol SCN min^{-1} g^{-1}) fresh tissue.

RESULTS AND DISCUSSION

The result is presented in table 1.

All the organs studied showed rhodanese activity. The activity of rhodanese in tnese tissues differed significantly ($P< 0.05$). The order of activity of the enzyme in the tissues of domestic fowl was liver › heart › kidney. The higher level of rhodanese in liver compared to other tissues may not be unconnected with the fact that cyanide detoxification occurs mainly in the liver (13). This result is consistent with the report of many other researchers which shows that rhodanese activity is higher in the liver than in other tissues of most animal species (7, 8, 14). The findings however differ from that reported by Oh *et al* (11); who shows that the highest activity in tissues of domestic fowl occured in the kidney.

The activity in the liver and heart of a day old domestic fowl is about twice the activity in the respective tissues of a 12 weeks old animal. In the kidney, however, the activity showed no significant

difference (P › 0.05) between the two age groups. Since rhodanese activity in tissues of animals have been reported to be influenced by the presence and level of cyanogenic glycosides in their diet (7,15,); the high level in tissues of a day old domestic fowl compared to a 12 weeks old fowl can not be tracked down to its encounter with exogenous cyanogenic glycoside; since the tissues were assayed before the animals received any form of feeding. It might be that, the enzyme plays some other role in tissues of domestic fowl in addition to cyanide detoxification. Some other physiological function have been proposed for rhodanese, which include its role in protein synthesis and energy metabolism (5, 11 - 14). It might be that rhodanese in these tissues is involved in the performance of these functions in addition to cyanide detoxification, since rhodanese level (in tissues of mouse) was correlated to the onset of organogenesis (9).

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Table 1: Rhodanese activity in tissues of a day old and 12 weeks old domestic fowl*

Age	Activity (µmol SCN min-1g-1 fresh tissue)		
	Liver	Kidney	Heart
A day old	11.30 ± 2.30[a]	1.08 ± 0.09[c]	3.125 ± 0.05[d]
12 weeks old	5.12 ± 0.85[b]	1.24 ± 0.08[c]	1.60 ± 0.09[e]

*Results are expressed as the mean ± S.D of determination on five (5) animals per age group.

a,b,c,d,e : Values bearing different superscripts differed significantly using analysis of variance.