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Histoenzymic intensity in the skin of dog infestated with ectoparasites

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Abstract:*A study was conducted to record the histoenzymic changes in the skin of dog infested with different ectoparasites. Infested tissue sections were treated with specific substrates for Succinate (SDH), CytochromeOxidase (CYO), Acid Phosphatase (ACPase) and Alkaline Phosphatase (AKPase) to record the histoenzymic reactivity in the skin of naturally infested dogs with Rhipicephalussanguineus, Ctenocephalidescanis and Trichodectescanis.Variable enzymatic reactions could be recorded in the infested skin (dermis and epidermis) of dog viz., weak in epidermis and strong to intense in dermis for SDH, weak in epidermis and weak to moderate in dermis for CYO and intense in epidermis but weak to moderate in dermis for AKPase, moderate to strong in epidermis for ACPase. The changes were discussed in the study.*

Key words: *Histoenzymic changes, Rhipicephalussanguineus, Ctenocephalidescanis, Trichodectescanis*

I. Introduction

Ectoparasitic infestations are major cause of dermatological problems in dog affecting the overall health of the animal. Some species of ectoparasite of dog infest human beings and draws much attention as a zoonosis. Among many diseases of dogs, skin diseases particularly due to ectoparasitic infestation such as scabies are of extreme importance since it is transmissible to human beings through direct or indirect contact [1]. Tick causes annoyance to animals as well as skin irritation, tick paralysis etc. and flea saliva is allergic to animal's skin [2]. Likewise mange is one of the most commonly occurring skin manifestations in dog, caused by the mites [2].The major effects of skin diseases are aesthetic and economic. Besides the texture of normal glitter of the skin, discomfort and scratching interfere with normal with normal rest and feeding. A damaged skin due to ectoparasites provides a favourable condition for the growth and multiplication of various pathogen by breaking the communication between the animal and its enviroment.The present work has been taken to record the histoenzymic reactivity in the skin naturally infested with the ectoparasites viz.Rhipicephalussanguineus, Ctenocephalidescanis and Trichodectescanis.

II. Materials and Method

For histoenzymic study, skin lesions naturally infested with Rhipicephalussanguineus, Ctenocephalidescanis and Trichodectescanis were collected from the stray dogs and preserved at -20^0C. Cryostat sections of the tissues were madein the cryotome. The cut tissue sections were treated with specific substrates for oxido-reductases, i.e., CytochromeOxidase (CYO); dehydrogenase like Succinatedehydrogenase (SDH), Alkaline (ALPase) and Acid Phosphatase (ACPase) following the standard procedures of [3], [4] and [5], (Table. 1). The color changes of the tissue sections due to enzymatic reactions were observed under an image analyser and images were digitally captured and discussed[5].

III. Results and Discussion

In the present study, variable enzymatic reactions in the skin of dogs infested with different ectoparasites were recorded and presented in Table. 2. The reaction of SDH was weak in the epidermis in Rhipicephalussanguineus(Fig.1), Ctenocephalidescanis(Fig.2) and Trichodectescanis(Fig.3) infestation. Strong reaction was observed in the dermis of dog due to infestation of Ctenocephalidescanis and Trichodectescaniswhere as it was intense in case of Rhipicephalussanguineus infestation. Weak reaction of CYO was seen in the epidermal layer of skin infested with Ctenocephalidescanis (Fig.4) and Rhipicephalussanguineus (Fig.5) whereas no reaction was observed in the skin infested withTrichodectescanis. In the dermis, moderate reaction was observed in case of Ctenocephalidescanisand Rhipicephalussanguineusand very weak reaction was observed in case of Trichodectescanis infestation. The reaction of AKPase was intense in the epidermis due to the infestation of Rhipicephalussanguineus and Ctenocephalidescanis(Fig.6) and strong due to the Trichodectescanis infestation (Fig.7). A moderate reaction of AKPase was observed in the dermis due

to Rhipicephalussanguineus and Ctenocephalidescanis infestationand weak reaction was observed in Trichodectescanis infestation. Moderate ACPase reaction was also observed in the epidermis in case of Rhipicephalussanguineus infestation and strong ACPase reactions were seen in case of Ctenocephalidescanis(Fig.8) and Trichodectescanis infestation (Fig.9). No reaction of ACPase was seen in the dermis of skin of dog due to Rhipicephalussanguineus, Ctenocephalidescanis and Trichodectescanis infestation.In demodicosis of dog, intense activity of oxidative enzyme and alkaline phosphatase around hair follicle and epidermis of infested skin was demonstrated by [7]. The present study indicates a skin tissue damage in terms of enzymic changes which has been speculated due to ectoparasitic infestation. Reaction of oxido-reductase and dehydrogenase decreases on ectoparasitic infested area unlike phosphatases which show increased reaction intensity.The findings of the present study further complements the histopathologicalchanges in natural Rhipicephalussanguineus, Ctenocephalidescanis and Trichodectescanis infestation in skin of dog[6].

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Table.1 Histoenzymic techniques used for the demonstration of different enzymes

Sl. No.	Enzyme	Substrate	Method	Incubation period
1.	Succinatedehydrogenase (SDH)	Di-Na Succinate	Nitro BT Method (Nachlas Crawford and Seligram, 1957 cited from Culling,1987)	5-20 minutes
2.	CytochromeOxidase (CYO)	N-phenyl-p-phenylenediamine, 1-hydroxy 2-naptholic acid and Sodium thiosulphate cobalt acetate	Method of Butcher et al.1964 cited byChayen et al. (1973)	60 minutes
3.	Alkaline phosphatase (AKPase)	Sodium alpha-NapthylphosphateDiazonium Salt	Gomeris method (Culling,1987)	60 minutes
4.	Acid phosphatase (ACPase)	Sodium acetate buffer,Sodium glycerol phosphate, lead nitrate	Simultaneous coupling Azo-dye method (Culling,1987)	60-90 minutes

Table.2: Histoenzymic intensity in the skin of dogs due to infestation of different ectoparasites:

Enzyme	Layer of skin	Ectoparasites		
		Tick (R. sanguineus)	Flea (C. canis)	Lice (T. canis)
Succinicdehydrogenase (SDH)	Epidermis	+	+	+
	Dermis	+ + + +	+ + +	+ + +
Cytochromeoxidase (CyO)	Epidermis	+	+	-
	Dermis	++	++	+
Alkaline phosphatase (AKPase)	Epidermis	+ + + +	+ + + +	+ + +
	Dermis	++	++	+
Acid phosphatase (ACPase)	Epidermis	++	+ + +	+ + +
	Dermis	-	-	-

Intensity of histoenzymic reaction:
(-) = Nil, + = Weak, + + = Moderate, + + + = Strong, + + + + = Intense

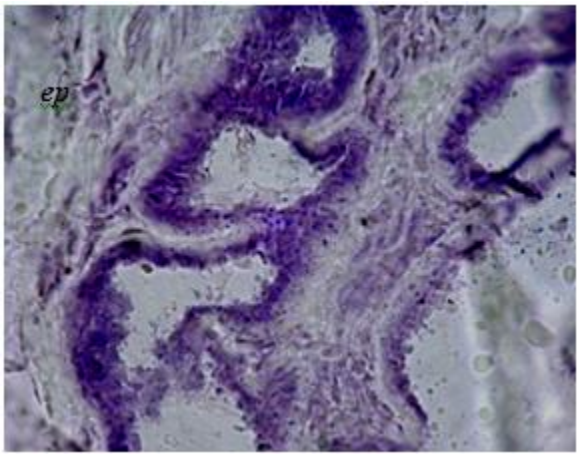

Fig. 1: Decreased reaction of SuccinateDehydrogenase (SDH) in the epidermal (*ep*) layer in tick infested area, Nitro B.T. method, X400.

Fig. 2: Decreased reaction of SuccinateDehydrogenase (SDH) in the epidermal (*ep*) layer in flea infested area, ns, normal skin, Nitro B.T. method, X400.

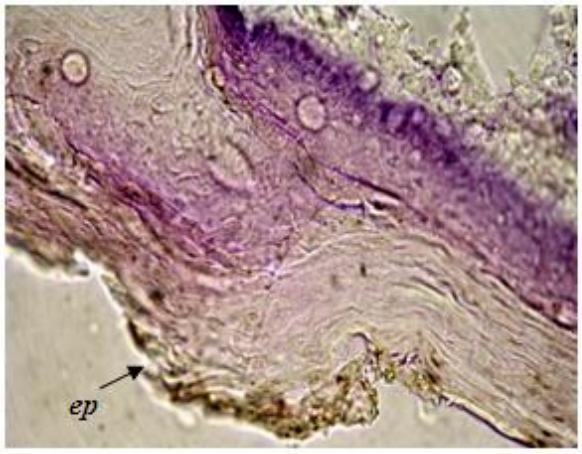

Fig. 3: Decreased reaction of SuccinateDehydrogenase (SDH) in the epidermis (*ep*) in lice infested area, Nitro B.T.

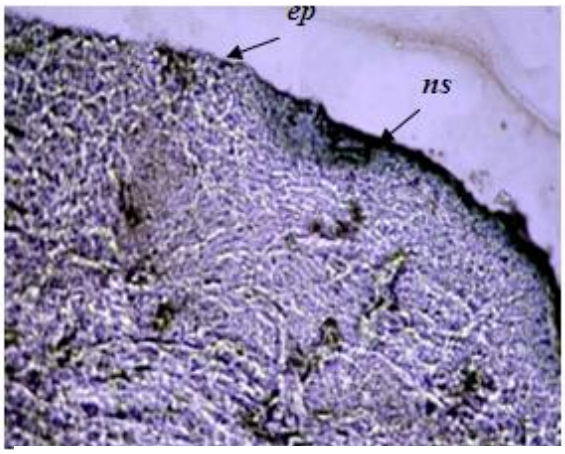

FIG. 4: Decreased reaction of CytochromeOxidase (CYO) in flea infested areas of epidermis (*ep*), *ns*: normal skin Butcher *et al*.1964, X400.

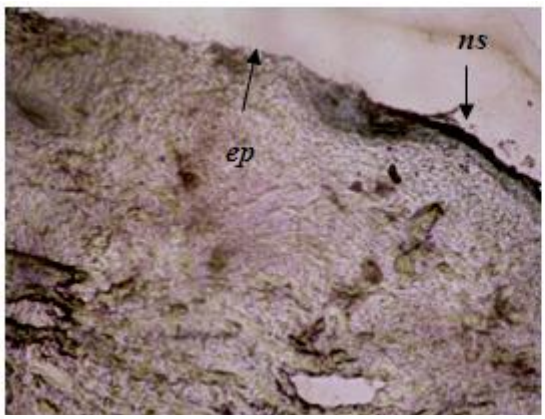

Fig. 5: Decreased reaction of CytochromeOxidase (CYO) in tick infested area of epidermis (*ep*), *ns*: normal skin Butcher*et al*.1964, X400.

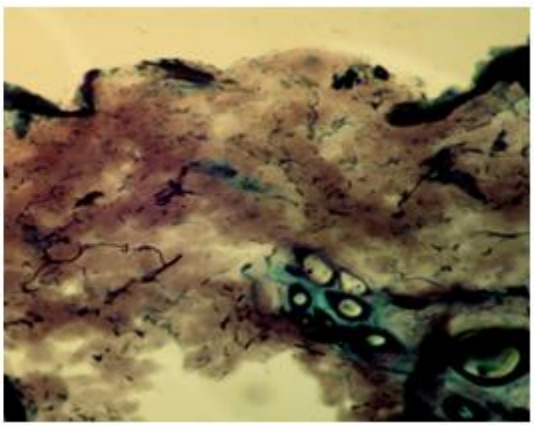

Fig.6: Intense reaction of Alkaline Phosphatase (AKPase) in the epidermis in flea infestation,Gomeris Method X100.

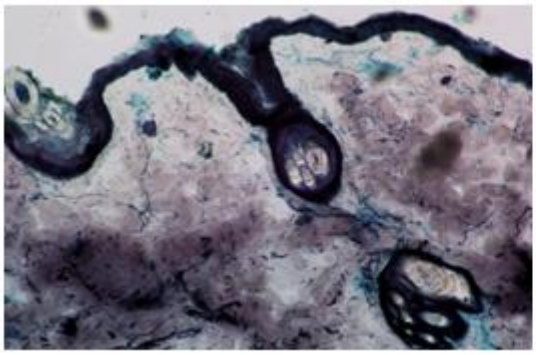

Fig. 7: Strong reaction of Alkaline Phosphatase (AKPase) in the epidermis in Lice infestation,Gomeris Method X100

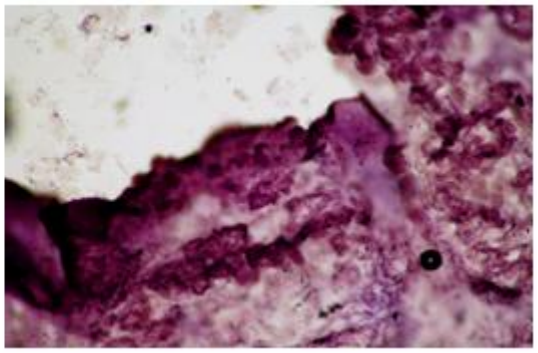

Fig. 8: Strong reaction of AcidPhosphatasePhosphatase (ACPase) in flea infestation in the epidermis,Azo -Dye Method,X100**.**

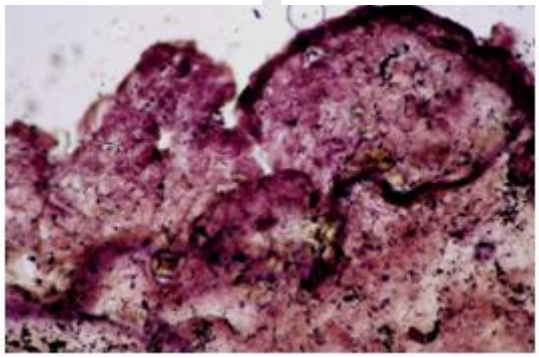

Fig. 9: Strong reaction of AcidPhosphatasePhosphatase (ACPase) in lice infestation in the epidermis,Azo -Dye