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Studies on the effect of dimethoate on the distribution of butyrylcholinesteras (BchE) in the optic lobe of *Gallus Domesticus (in vitro)*

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Abstract: Present study was made to know the effect of dimethoate organophosphate pesticide on BchE activity in different layers of optic lobe of Gallus domesticus, however dimethoate treatment resulted in the various layers of optic lobe showed strong BchE activity in normal (controlled) condition except NML. The in vitro exposure of Dimethoate resulted in the significance decline in the enzymatic activity.

Keywords: Gallus Domesticus, in vitro, dimethoate.

1. Introduction

Various workers have observed cholinergic pathway in the retina of vertebrates and also studied distribution of BchE (Hebb *et al.,1953*, Erila,1963, Nicholas and Koelle, 1968, Nicholas *et al.*, 1972, After Massoulie and Bon, 1982;).Interestingly, avian esterase are largely of 'B' type and are inhibited by organophosphate pesticides, study on the effect of Dimethoate on the BchE compliment of optic lobe would be most suitable to correlate neuropathy induced by organophosphate pesticide.

2. Material and method

Optic lobe were quickly dissected out and were fixed in 10% chilled neutral Formalin for 12-15 hrs at 4ºC. Sections of 10-14micron thickness were cut on cryostat at 10 ºC. After thorough washing in distilled water, the sections were processed for demonstration of butrylcholinesterase activity by direct coloring thiocholine method (karnovsky and Roots, 1964) prescribed controls were also carried out to ensure the true localization of the BchE. In the present study Ramon Y Cajal (1911) nomenclature was used for different layers of optic lobe. Abbreviation used to describe various concentration of Dimethoaterase as under;

N = normal
D_2 = 100 mm
D_3 = 200 mm

3. Result and discussion

The Stratum Opticum(SO) is strongly positive for BchE activity in N & D_2 condition while mild in D_3.The Stratum Fibrosum Et Griseum Superficiale(SFGS) revealed an intense BchE activity in N, mild in D_2 and negative in D_3.The stratum griseum centrale (SGC) depicted strong BchE activity in N, mild in D_2 and negative in D_3.Stratum album centrale (SAC) demonstrated strong BchE activity in N, moderate in D_2 and negative in D_3.

The Nucleus Isthmus Pars (NIP) magnocellularis revealed intensely BchE activity in N, moderate in D_2 and mild in D_3.The Nucleus Mesencephalicus(NML) revealed a negative BchE activity in N, D_2 and D_3.

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Table - Effect of dimethoate on the distribution of the butrylcholinesterase in the different layers of optic lobe. (*in vitro*)

Layer of optic lobes	Normal(N)	Different concentration of dimethoate	
		100 mM (D_2)	200 mM (D_3)
SO	++++	++++	+
SFGS	+++	+	-
SGC	+++	+	-
SAC	+++	++	-
NIP	++++	++	+
NIM	++++	++	+
NML	-	-	-

Note- - =Negative activity,+ = Mild activity,++ = Moderate activity, +++ = Strong activity, ++++= intense activity

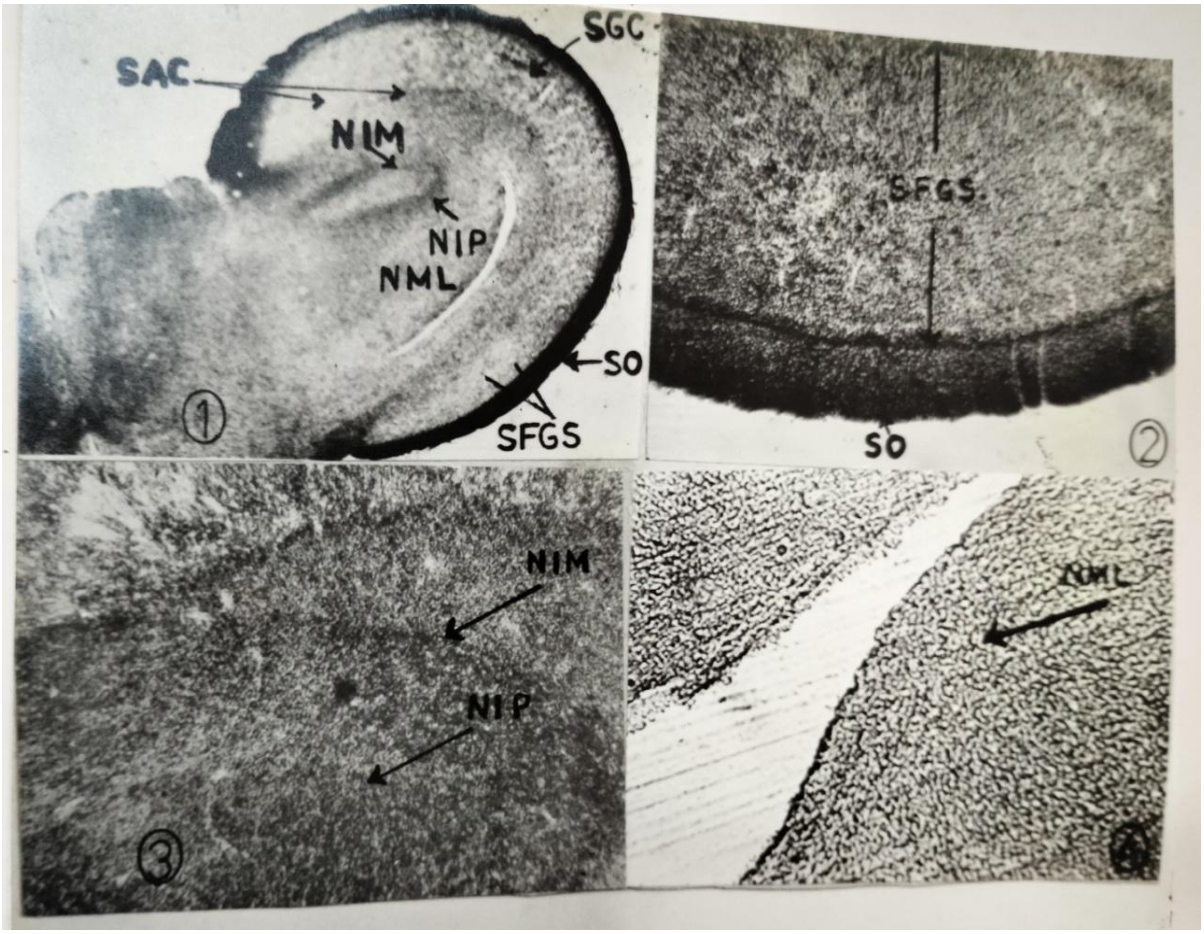

Figure A- 1. Low power photomicrograph of optic lobe of Gallus dometicus showing BCh E activity in the normal condition in various layers. Stratum opticum (SO), stratum fibrosum et griseum centrale (SFGS), stratum griseum centrale (SGC), stratum album centrale (SAC), Nucleus ishtmus pars parvocellularis (NIP), nucleus ishtmus pars magnocellularis (NIM), nucleus mesencephalis lateralis (NML); (2) intense BChE activity in the SO, strong in SFGS, in SGC; (3) Negative BChE activity in the NML; (4) instense BCHE activity in NIP and in NIM.

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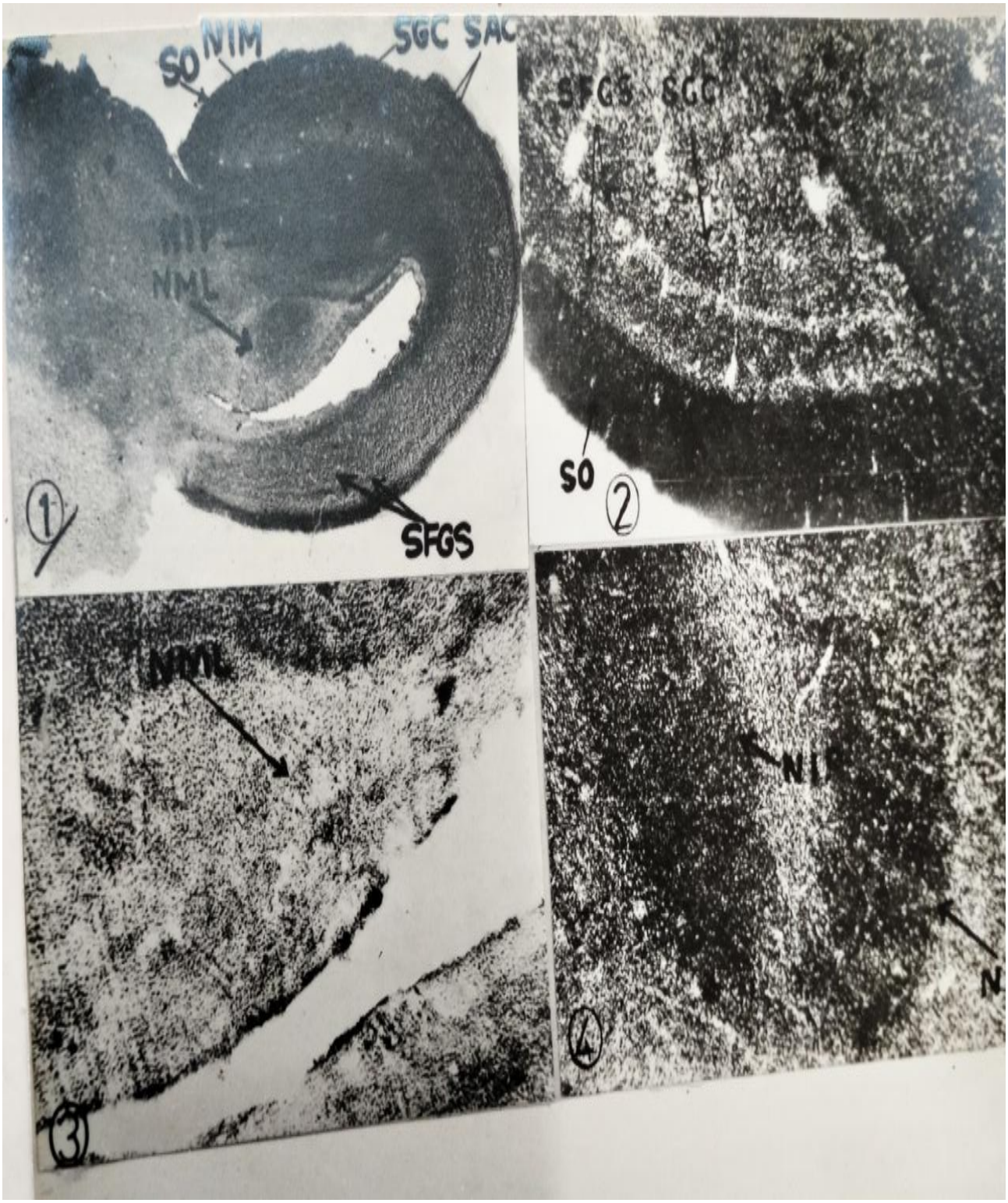

Figure B-(1) low power photomicrograph of optic lobe of *Gallus domesticus* showing BChE activity in the D_2 condition treatment in various layers Stratum opticum (SO), stratum fibrosum et griseum centrale (SFGS), stratum griseum centrale (SGC), stratum album centrale (SAC), nucleus isthmus pars parvocellularis (NIP), nucleus isthmus pars magnocellularis (NIM), nucleus mesencephalicus lateralis (NML); (2) intense BChE activity in SO, mild in SFGS and SGC, moderate in SAC; (3) Intense BChE activity in NIP and in NIM; (4) BChE activity in NML.

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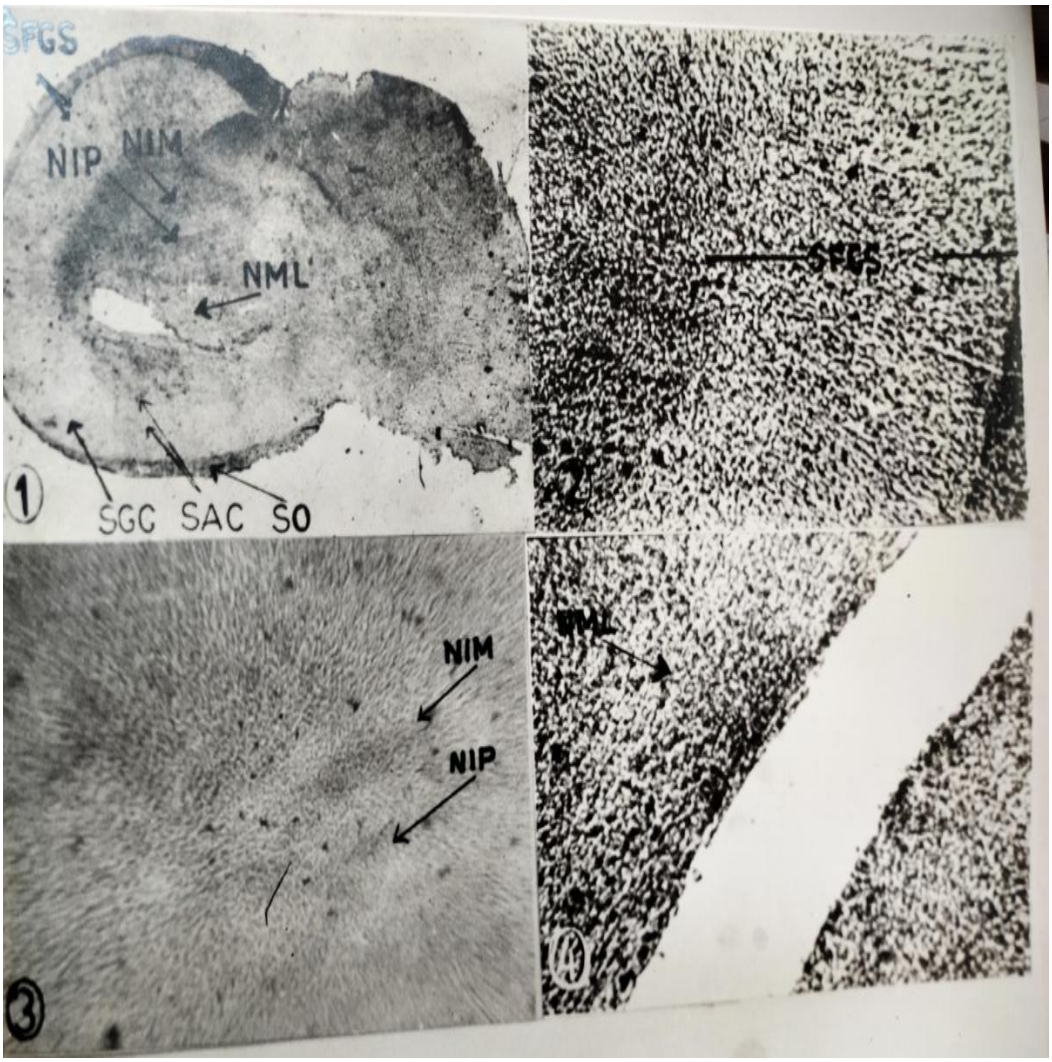

Figure C- (1) low power photomicrograph of optic lobe of Gallus dometicus showing BChE activity in D_3 condition in various layers. Stratum opticum (S0), stratum fibrosum et griseum super ficiale (SFGS), stratum griseum centrale (SGC), Stratum album centrale (SAC), Nucleus isthmus pars magnocellularis (NIP), nucleus isthmus pars magnocellularis (NIM), nucleus mesencephalicus lateralis; (2) high magnification of SO and SFGS, observed mild BChE activity in SO, and negative in SFGS; (3) Mild BChE activity in NIP; (4) Negative BChE activity in NML.

4. Discussion

The *in vitro* exposure of Dimethoate in the present study has caused considerable decline in BchE activity in different layers of optic lobe.

5. Conclusion

It is inferred that BchE is very significant component of optic lobes, and play significant role in neurotransmission of visual impulse in birds. Moreover, inhibition of owing to Dimethoate in in-vitro exposure condition is also a sensitive indicator of toxicity in optic lobe.

References

[1]. Hebb, C.C., Silver, A. Swan, A.A.B. and Wlash, E.G. (1953). A histochemical study of cholinesterase of rabbit retina and optic nerve. Q.J. Experimental Physiology. 38; 447-476.
[2]. Karnovsky, M.J. and Roots, L. (1984). A direct colouring thicholine method for Cholinesterase. Journal of histochemical cytochemistry. 12; 219-221.
[3]. Massoulie, J. and Bon, S. (1982). The molecular forms of cholinesterase and acetyl cholinesterase in vertebrates. Annual review of neurological science. 51; 57-106.

ISSN: 2349-7637 (Online)

[4]. Nichols, C.W. and Koelle, G.B. (1968). Comparison of localization of acetylcholine and non specific cholinesterase activity in mammalian and avian retinas. Journal of comparative neuroscience. 50; 475-472.
[5]. Nichols, C.W., Newittt, J. and Laties, A. (1972). Localization of acetyl cholinesterase in teleost retina. Journal of histochem, Cytochem. (2) feb. 130.
[6]. Romon Y Cajal, S. (1911). Histologie du systeme nerveuse de 1' home et de vertebrates (translated by L.Azoualy), Volume I and II. Paris. Maloine reprinted 1952 and 1955.Madrid Consejo de Investigaciones Cientifieds.

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