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Original Research Article

Histopathological Study of Chloropyrifos Induced Toxicity in Vanraja Birds

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Keywords

Histopathology, Chloropyrifos and Vanraja birds

A B S T R A C T

A study was conducted on 140 in number of Vanraja Birds which were grouped in I, II, III & IV. Group IV was treated as control group. Histopathological changes in visceral organs. Liver lesion consisted of moderate to severe congestion in central and portal veins, hyperemia, cellular swelling with granular cytoplasm. In Kidneys, there was congestion and extensive haemorrhages and infiltration of mononuclear cells. The heart of the CPF treated birds revealed that congestion and haemorrhage in blood vessels and separation of cardiac muscle fibres. Brain perivascular oedema and dialatation of Virchow-Robin space in all treated groups, more severe in Gr III. Congestion in lungs of birds of all treated groups more evidently in GrII and GrIII after 4th week post treatment. Intestine of Gr. II of birds showing atrophy of different layer of intestine and birds of Gr. III showed mild to moderate haemorrhages and congestion and atrophy of different layer of intestine of Vanraja birds.

Introduction

Among the various organophosphorus (OP) insecticides, the [CPF: O, O-diethyl-O-(3, 5, 6-trichloro-2-pyridyl) phosphorothioate], a broad spectrum insecticide has gained popularity related in veterinary medicine globally.

Chloropyrifos is a white crystalline solid and a strong mercaptan odour Worthing, (1987). Chloropyrifos does not mix well in water so it is mixed in oily liquid before application to animals or crops. Chloropyrifos may be applied to crops in a micro-encapsulated form. Chloropyrifos is the active ingredient of sevsral commercial insecticides Organophosphates (OPs) including Dursban® and Lorsban® (ATSDR, USA, 1997). Chloropyrifos induces neurotoxicity and tissue damage with observable signs of poisoning. Chloropyrifos acts on the nervous system of the birds, mammals, fish and many organisms. It acts as acetylcholinesterase (AChE) inhibitor.

Materials and Methods

A study was conducted on 140 in number of Vanraja Birds which were grouped in I, II, III & IV. Group IV was treated as control group. Histopathological changes in visceral organs were studied. Tissue pieces of liver, kidney, brain, lungs, heart and intestine were

preserved in 10% formalin solution immediately after necropsy. After proper fixation in formalin for 3-4 days, the tissues were cut into block of 2 cm^2 and placed under running tap water in order to remove formalin from tissues. The tissues were dehydrated in order- 50%>70%>95%> absolute alcohol for 1h in each. The tissues were then kept in cedar wood oil until cleared. Finally, the tissues were placed in melted paraffin (congealing point 58^0-60^0C) from No.1 to No.4 gradually for 1h in each and blocks were prepared by embedding tissues in fresh melted paraffin. Tissue sections of about 3-5 µ thick were cut in a microtome. Sections were stained with Mayer's haematoxylin and eosin (Luna, 1968), for histopathological examinations**.** Finally, the sections were mounted over a grease free glass slide with help of cannada balsam covered by a glass cover and examined under microscope.

Results and Discussion

Liver

Histopathologically marked degenerative changes occurred which were time and dose dependent. Lesion consisted of moderate to severe congestion in central and portal veins, hyperemia, cellular swelling with granular cytoplasm congestion in blood vessels, necrosis in the parenchyma and connective tissue proliferation between the lobule (fig: 1) sinusoidal dialatation, degeneration and coagulative necrosis of hepatocytes in the centrilobular and peripheral areas of liver i. e fatty change, fibrous tissue proliferation in portal triad in advanced stages of Gr III. birds. There was disorganisation of hepatic cords in Gr II and Gr III birds after 3rd week post treatment. Some of the liver section showed mononuclear cell infiltration. Similar lesions in the liver were reported by Malik *et al.,* (2002), Tripathi and Srivastava, (2010) in CPF treated birds and by Sodhi *et al.,* (2008) in CPF treated broiler chicks. The sinusoidal spaces were expanded due to shrinkage and necrosis of hepatic cells.

Kidney

Microscopically, histopathological changes were evident in all treated groups from 2nd week onward which were times and dose dependent. It was congestion and extensive haemorrhages in the kidney tubules and infiltration of mononuclear cells in kidney and condensation of nuclei of the tubular epithelium, degeneration and necrosis of the tubular epithelium (Fig: 2) in advanced stage of toxicity. Mononuclear cell aggregation becausing nodular structure, hypertrophy and hyperplasia of capillary endothelium of glomeruli in high dose group. Desqumation of tubular epithelium and albuminous precipitation in lumen of tubules in all groups from 4th week post treatment. The histopathological findings of kidney in birds of all the groups of the present study corroborated with the findings of Kammon *et al.,* (2010b) in layer chickens and in broiler birds- Malik *et al.,* (2002), Krishnamoorthy *et al.,* (2007) and Kumar, (2011).

Heart

Histopathologically, there was mild histological alterations in myoca-rdium with loss of cross striation, fragmentation of myofibres and diffuse infiltration of mononuckear cells between muscle fibres. The heart of the CPF treated birds revealed congestion and haemorrhage in blood vessels and separation of cardiac muscle fibres (fig: 3). The histopathological changes found in the heart of CPF intoxicated birds in the present study corroborated the reports of the Kumar, (2011) in broiler birds.

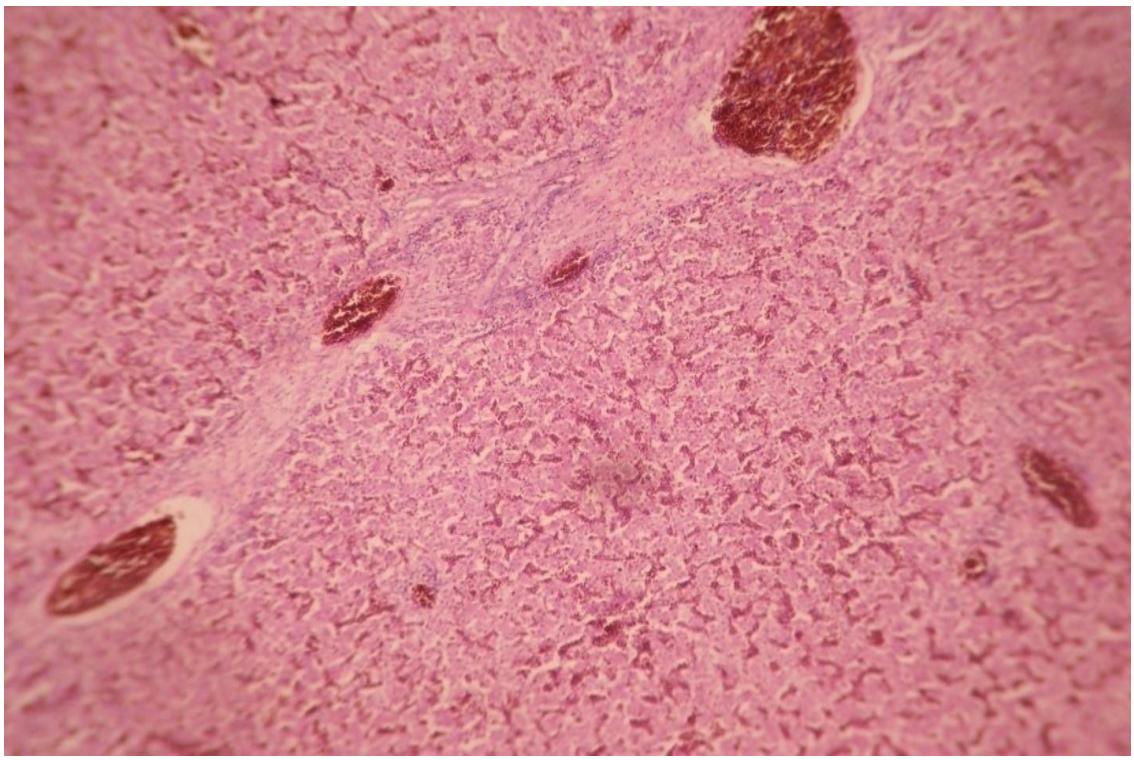

Fig.1 Microphotograph showing severe congestion in central and prtal vein evidenced by connective tissue proliferation between the hepatic lobules of Vanaraja birds treated with chlorpyrifos 70mg/kg feed (H. & E.; X 40)

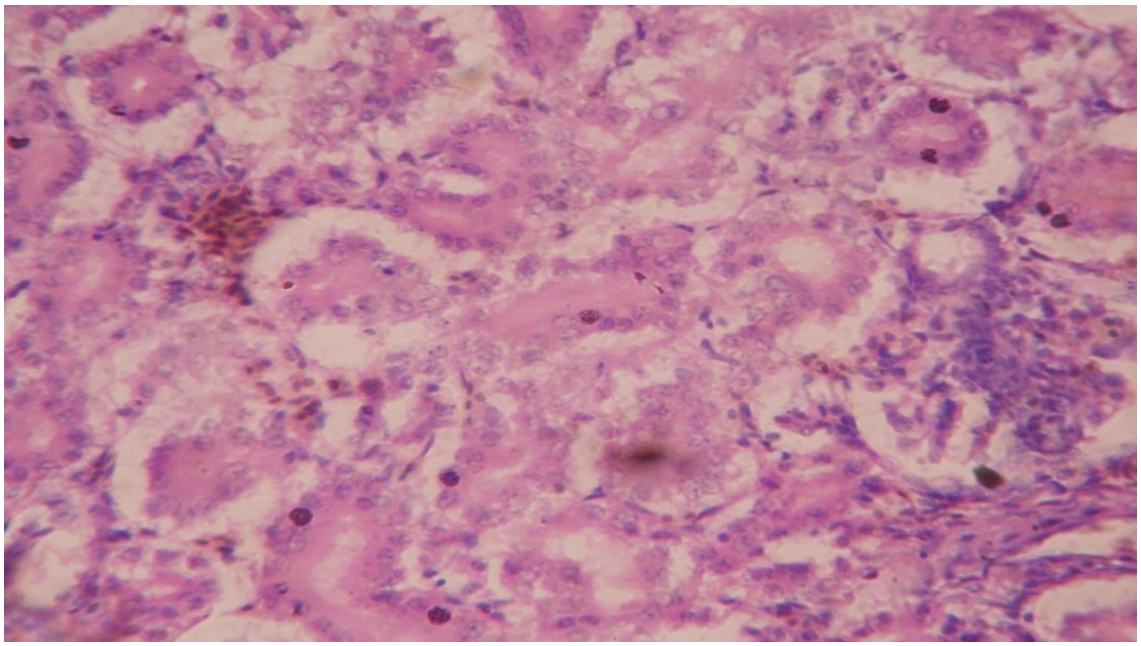

Fig.2 Microphotograph showing degeneration of tubules, Congestion and infiltrations of mononuclear cells of kidney of Vanraja birds treated with chorpyrifos 70 mg/kg feed(H.& E. ; x 100.)

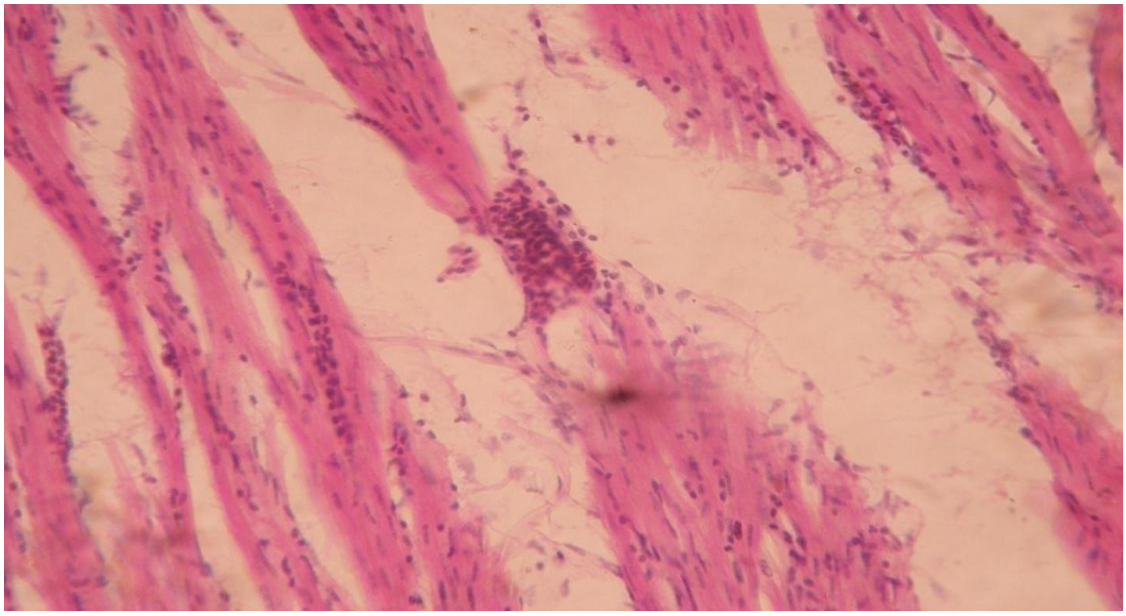

Fig.3 Microphotograph showing Conjestion & Haemorrhage in blood vessels & cardiac muscles of Vanaraja birds treated with chlorpyrifos 140 mg/kg feed (H.& E. ; x 40)

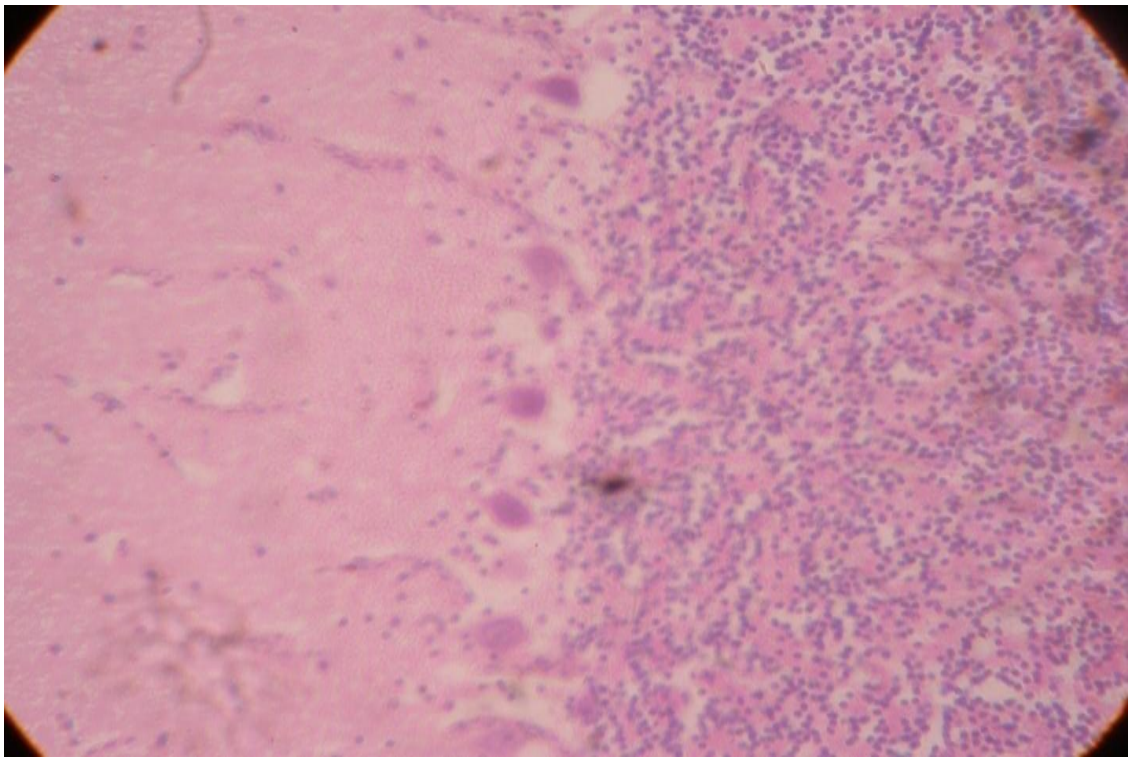

Fig.4 Microphotograph showing degeneraion of purkinje cells and infilteration of inflamatory cells of brain Vanaraja birds treated with chlorpyrifos 70 mg/kg feed (H & E ; x 40)

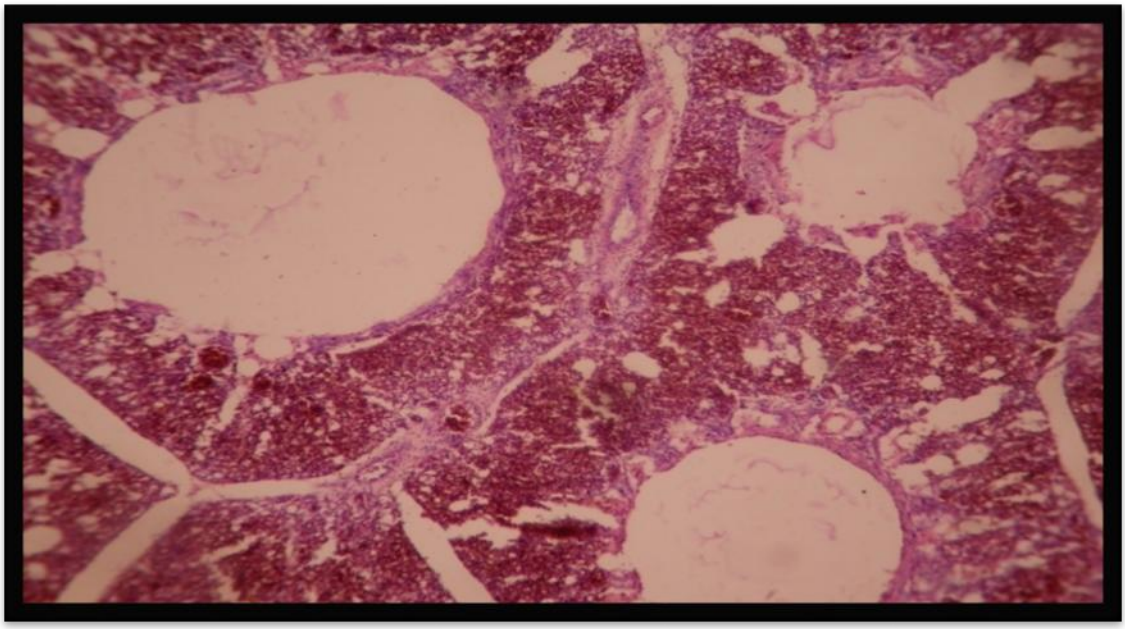

Fig.5 Microphotograph showings proliferation of connective tissue between the alveoli and interlobular spaces in Lung of Vanraja birds treated with Chlorpyrifos 140 mg/kg feed (H. & E. ; X 450.)

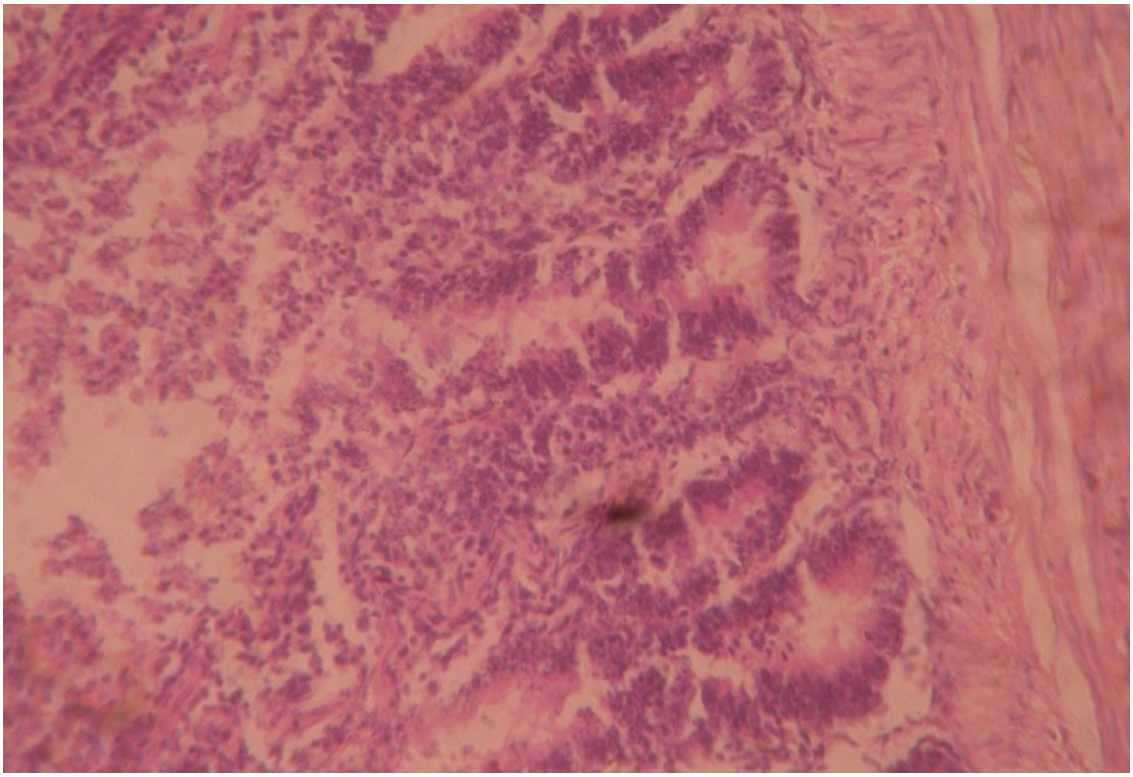

Fig.6 Microphotograph showing atrophy of different layer of intestine of Vanraja birds treated with chlorpyrifos 35mg/kg feed. (H. & E. ; x 450.)

Brain

Microscopically in the cerebrum, there was congestion of blood vessels. Perivascular oedema and dialatation of Virchow-Robin space in all treated groups, more severe in Gr III. It was also focal and diffuse gliosis and necrosis of some neurons in different areas were evident.

In the cerebellum, purkinje cells appear degenerated, infiltration of inflammatory cells (fig: 4). Deplation of Purkinje cells were also noticed at some places. Mild oedema in Purkinje cell layer in advanced cases.

These reports are in agreement with findings of Malik *et al.*, (2002) and Yadav *et al.*, (2003) who reported perivascular and perineuronal oedema, gliosis and degeneration of a few neurons and Purkinje cells in broilers.

Also the present study is in agreement with Krishnamoorthy *et al.*, (2007) who found brain of CPF fed birds alone showed mononuclear cell infltration in meninges.

Lungs

There was congestion in birds of all treated groups more evidently in GrII and GrIII after 4th week post treatment. Some of atelectic alveoli with some emphysemated also, accumulation of serous exudates in alveoli with mono-nuclear inflammatory cells in perivascular areas of Gr. II birds. In birds of Gr. III proliferation of connective tissue between the alveoli and interlobular space in lungs (Fig: 5).

The changes found in the lungs of chlorpyrifos treated birds in the present study is in agreement with the reports of the Kumar, (2011) in broiler birds.

Intestine

Intestine of Gr. II of birds showing atrophy of different layer of intestine (Fig: 6) and birds of Gr. III showed mild to moderate haemorrhages and congestion and atrophy of different layer of intestine of Vanraja birds after 4th week post treatment. There was necrosis of villi and goblet cell hyperplasia more intense in GrIII birds. Mononuclear infiltration in *lamina propria.*

The changes found in the intestine of CPF treated birds in the present study simulated the reports of the Kumar, (2011) in birds induced with chlorpyrifos.

Thus, from the present study it could be concluded that CPF toxicity is induced in birds also exhibiting nervous symptoms can be fatal also.

Acknowledgement

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