HAEMATOLOGICAL CHANGES IN PENICILLIC ACID MYCOTOXICOsis IN THE BROILER CHICKEN

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Mycotoxin contamination of various feeds and food commodities is a global problem. Penicillic acid was originally isolated from the cultures of *Penicillium puberulum*. Later it was found that *P. cyclopium* Westling produced relatively larger amount of penicillic acid (Bentley and Kell, 1962). Penicillic acid toxin was shown to have antibacterial, antiviral, antitumour, antidiuretic, cytotoxic, hepatotoxic and carcinogenic properties in mice and rats (Suzuki et al., 1971; Kawasaki et al., 1972). The present observation is on haematological changes in penicillic acid and mycotoxocosis in broiler chicken.

**Materials and Methods**

The *Penicillium cyclopium* NRRL 1888 culture procured from the Microbial Genomics and Bioprocessing, USDA, USA was subcultured on potato dextrose agar at 10 days interval. The toxin produced on maize (LeBars, 1960) was extracted for the presence of mycotoxin. One hundred grams of coarsely ground maize was taken in 500 ml Erlenmeyer flasks. The flasks were autoclaved (15 lb psi/30 min), cooled and inoculated at 24°C for 7 days. After 48h of inoculation, whitish mould growth was seen on the surface of the maize, later turning to dull blue green colour (Dirkinshaw et al., 1936). After incubation, the mouldy maize culture was ground to a fine powder and quantified by using thin layer chromatography method.

Known amount of penicillic acid was incorporated into the toxin free diet, so that the diet contained 240, 360 and 480 ppm penicillic acid. The crude protein was adjusted to 23% with addition of fishmeal.

Thirty two, day old broiler chicks were randomly allotted to three groups of eight chicks each. The rest was kept as control. The control and toxin mixed diets were fed to different groups in the above concentration for 28 days from the day of the hatch. Feed consumption was recorded at weekly intervals. Blood samples were collected from six birds in each group by intracardiac puncture and haematological studies were conducted. Necropsy examination was conducted on these birds and various organs were collected for histopathological examination.

**Results and Discussion**

Mean ± SE haematological values of broiler chicken fed with penicillic acid are presented in the table. The differences were highly significant (P < 0.01) for packed cell volume (PCV), haemoglobin (Hb) and total erythrocyte count (TEC) between the control and 240 to 480 ppm penicilllic acid treated groups. Among the toxin treated groups, 480 ppm differed significantly (P < 0.01) from
Table: Haematological values of broiler chicken fed penicillic acid (Mean ± SE)

<table>
<thead>
<tr>
<th>Penicillic Acid levels</th>
<th>PCV (%)</th>
<th>Hb (g/dL)</th>
<th>TEC (m/cmm)</th>
<th>MCV (fl)</th>
<th>MCH (pg)</th>
<th>MCHC (g/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 ppm</td>
<td>32.00± 1.53</td>
<td>8.5± 1.10</td>
<td>3.62± 0.42</td>
<td>88.40± 0.71</td>
<td>23.40± 0.45</td>
<td>26.49± 1.13</td>
</tr>
<tr>
<td>240 ppm</td>
<td>26.17± 1.39</td>
<td>6.91± 0.98</td>
<td>2.69± 0.74</td>
<td>97.70± 0.84</td>
<td>25.60± 0.39</td>
<td>26.32± 1.39</td>
</tr>
<tr>
<td>360 ppm</td>
<td>25.00± 1.89</td>
<td>6.66± 1.11</td>
<td>2.55± 0.66</td>
<td>98.60± 0.76</td>
<td>26.10± 0.37</td>
<td>26.55± 1.45</td>
</tr>
<tr>
<td>480 ppm</td>
<td>21.00± 2.02</td>
<td>5.16± 1.01</td>
<td>1.81± 0.60</td>
<td>115.80± 1.05</td>
<td>28.50± 0.47</td>
<td>25.39± 1.27</td>
</tr>
</tbody>
</table>

Means with same superscripts in the same column do not differ from each other (P > 0.01).

that of 240 ppm. There was a significant (P < 0.01) reduction in the PCV, Hb and TEC in the 240, 360 and 480 ppm toxin treated groups when compared to the control. No significant differences were observed between the control and toxin treated birds except 480 ppm groups for the mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH). All the penicillic acid treated birds revealed significant (P < 0.01) reduction in the PCV, Hb and TEC values indicating anaemia. Normocytic, normochromic anaemia was observed in the 240 and 360 ppm groups, while it was macrocytic normochromic anaemia in the 480 ppm penicillic acid fed group. Reduced feed consumption, lesions in the crop, proventriculus, gizzard, intestine, pancreas and liver impaired the digestion, absorption and metabolism of nutrients and hypoproteinaemia observed in the study could have contributed to anaemia. Macrocytic normochromic anaemia found in the 480 ppm penicillic acid fed birds could be attributed to folate deficiency (Kociba, 2000) that might have occurred due to poor feed consumption and utilization. From these findings the anaemic changes in penicillic acid toxicity could be attributed to a combination of dyshaemopoietic, haemolytic and haemorrhagic type.

Summary

Anaemia was observed in broiler chickens fed 240, 360 and 480 ppm penicillic acid for four weeks from day of hatch. Significant haematological changes were seen in penicillic acid toxicosis in broiler chicken.

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References