Effect of Toxin Binders on Immune Response and Antioxidant Profile of Broilers in Sublethal Ochratoxicosis*

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Abstract
The immune response to NDV vaccination and liver antioxidant profile of broilers fed with ochratoxin at 0.5ppm level under cover of two commercially available toxin binders were studied. NDV-B and NDV-L vaccinations were done on the 7th and 28th day respectively and the results are documented.

Key words: Ochratoxin, vaccination, toxin binder, antioxidant profile

Ochratoxin is usually present in poultry feed at very low levels. Even at these levels deleterious effects are observed. So different combinations of toxin binders are added to the feed to reduce its absorption. The present study was undertaken to assess the liver antioxidant level and immune response to vaccination on feeding toxin binders in ochratoxicosis.

Materials and Methods
Seventy-two, day old straight run broiler chicks randomly allotted into 12 birds each in control (T1), binder 1 (T2), binder 2 (T3), ochratoxin (T4), ochratoxin and binder 1 (T5), ochratoxin and binder 2 (T6) groups were wing-banded and housed in battery brooders. Powdered wheat culture of known ochratoxin (OA) level prepared from A. ochracerus NRRL 3174 culture was added to standard broiler ration, to get a final 0.5ppm OA. Two commercial multitoxin binders designated as Binder 1 (B1) and 2 (B2) procured locally were added to the corresponding diets at the manufacturers recommended dose levels. In addition to hydrated sodium calcium aluminosilicate, mannan oligosaccharide and activated charcoal, B1 contained buffered organic acids, antioxidants and Picrohiza kurroa and B2 contained organic acids, vinyl pyrrolidone homopolymers and lipotropic factors. Vaccination with NDV-B and NDV-L were done on 7th and 28th day respectively. Six birds from each group were sacrificed on 3rd and 6th week.

Blood samples were collected in serum vials for serum separation and liver samples were stored at 20°C until the following assays were done. The liver samples were taken to assess antioxidant profile as cited by George (2007). The antibody titre and cell mediated immunity against NDV was determined by indirect ELISA kit and by colorimetric blastogenesis assay (Reynolds and Maraqa, 2000) respectively. The data were subjected to one-or two-way analysis of variance using SPSS version 9.0.

Results and Discussion
Mean ± SE values of NDV-B and NDV-L titers and spleenocyte stimulation index are presented in Table I. Highly significant (P<0.01) differences were observed between control and all other groups for NDV-B and NDV-L titre. There was a significant (P<0.01) decrease in NDV titers in all the groups when compared to the groups T1. T4 and OA + binder groups showed no variation. Comparison of mean values revealed that there was a highly significant (P<0.01) difference between the controls and all other groups except T3. The splenocyte stimulation index of birds given either of the binders with OA differed significantly (P<0.01) from T4. Significant (P<0.01) decrease in splenic lymphocyte stimulation index was observed in all the groups when compared to the T1 except with T3.

Overall mean ± SE liver lipid peroxidation values and antioxidant profile are shown

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Comparison of means revealed significant (P<0.05) difference between control and all other groups except T2 for TBaRs. There was significant (P<0.05) increase in TBaRs values in all the groups when compared to the control group. Comparison of means of antioxidants revealed significant (P<0.05) differences between control and all other groups. Binder groups did not differ from control for GST. No significant differences were observed between T4 and OA+Binder groups for GSH and SOD. There was significant (P<0.05) decrease in the GSH, GPx, SOD and CAT and increase in GST in all groups when compared to the control.

The study indicated inadequate protection of binders to the toxic effects of OA as seen by high lipid peroxidation, low antioxidant profile and low humoral and cellular immune response to NDV vaccination. Similar observa-

<table>
<thead>
<tr>
<th>Groups</th>
<th>NDV-B</th>
<th>NDV-L</th>
<th>Splenocyte stimulation index</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>4.45±0.19</td>
<td>4.54±0.14</td>
<td>0.71±0.04</td>
</tr>
<tr>
<td>T2</td>
<td>3.75±0.18</td>
<td>3.44±0.12</td>
<td>0.46±0.04</td>
</tr>
<tr>
<td>T3</td>
<td>3.68±0.25</td>
<td>3.21±0.06</td>
<td>0.52±0.05</td>
</tr>
<tr>
<td>T4</td>
<td>2.83±0.07</td>
<td>2.88±0.09</td>
<td>-0.32±0.07</td>
</tr>
<tr>
<td>T5</td>
<td>3.07±0.09</td>
<td>2.82±0.04</td>
<td>0.04±0.07</td>
</tr>
<tr>
<td>T6</td>
<td>3.00±0.08</td>
<td>2.87±0.07</td>
<td>0.05±0.04</td>
</tr>
</tbody>
</table>

Means with same superscripts within a column do not differ from each other (P>0.05)

<table>
<thead>
<tr>
<th>Groups</th>
<th>MDA (TBaRs)</th>
<th>GSH</th>
<th>GPX</th>
<th>GST</th>
<th>SOD</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>142.07±16.03</td>
<td>4.40±0.19</td>
<td>39.85±1.70</td>
<td>0.36±0.02</td>
<td>4.47±0.46</td>
<td>2.11±0.10</td>
</tr>
<tr>
<td>T2</td>
<td>178.97±19.28</td>
<td>3.42±0.29</td>
<td>35.61±1.26</td>
<td>0.37±0.01</td>
<td>2.91±0.33</td>
<td>1.21±0.11</td>
</tr>
<tr>
<td>T3</td>
<td>218.83±25.15</td>
<td>3.36±0.21</td>
<td>33.82±1.43</td>
<td>0.39±0.01</td>
<td>1.65±0.33</td>
<td>1.26±0.21</td>
</tr>
<tr>
<td>T4</td>
<td>458.90±35.28</td>
<td>0.89±0.05</td>
<td>1.32±0.28</td>
<td>0.63±0.05</td>
<td>0.80±0.14</td>
<td>0.29±0.06</td>
</tr>
<tr>
<td>T5</td>
<td>350.57±16.65</td>
<td>0.93±0.04</td>
<td>25.31±2.11</td>
<td>0.46±0.03</td>
<td>1.16±0.22</td>
<td>0.98±0.08</td>
</tr>
<tr>
<td>T6</td>
<td>347.10±22.21</td>
<td>0.89±0.02</td>
<td>25.47±1.32</td>
<td>0.45±0.05</td>
<td>1.37±0.34</td>
<td>0.98±0.07</td>
</tr>
</tbody>
</table>

Means with same superscript within a column do not differ from each other (P>0.05)

TBaRs - nm of MDA/g of tissue  GSH - mg/g of tissue  GST - µm CDNB - GSH conjugate formed/min/mg protein  GPX - µm of glutathione utilized/min/mg protein  SOD - Enzyme required to inhibit 50% pyrogallol auto oxidation/min/mg protein  CAT - µm of H_2O_2 decomposed/min/mg protein
tion was also made by Grant and Philips (1998) and opined that aflatoxin is the only mycotoxin that is bound by HSCAS. Even though gluco-
mannan was present in the binders which effectively binds to OA as reported by Raju and Devegowda (2000), there might have some inter-
action between HSCAS and glucomannan that would have decreased the action of the latter, which needs to be elucidated. Moregaonkar et al., (2007) also reported that addition of Toxib-
ind did not have much desired effect in 1 ppm OA fed birds.

In the present study, binder 1 and 2 contained aluminium silicates, activated charcoal and glucomannan which are the preferred adsorbents (Girish and Devegowda, 2006). In addition the binder 2 contained vinyl-
pyrolidone homopolymers and lipotropic factors. It is not vivid that the beneficial effect of binder 2 is due to the presence of these latter ingredients. Therefore, the role of vinypyrilidone homopoly-
mers and lipotropic factors in ameliorating the toxic effects of AF needs to be further investig-
gated.

Summary
The study revealed high lipid peroxidation, low antioxidant profile and low humoral and cellular immune responses to NDV vaccination. Hence it could be concluded that toxin binders were unable to alleviate the deleterious effects of ochratoxin and further study is required to determine the interactions of combining various types of binders.

Acknowledgement
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ogy, Madras Veterinary College for providing NDV ELISA kits and facilities.

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