RESISTOTYPES IN THE APEC STRAINS

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Summary

Research has been performed on a number of 121 E. coli strains genotypically and phenotypically classified in the APEC pathotype. In the investigations were pursued resistotypes in 121 APEC strains isolated from broilers of different ages, in intensive growth system. The obtained results show that in these strains was revealed the phenomenon of resistance to one or more of the antibiotics used. Analyzing these results is observed that against to 9 antibiotics, the strains tested were resistant ranged between 61.98% and 100%. Only 12.40% of isolates tested were resistant to amoxyclave and the phenomenon of resistance has not been observed to florfenicol.

Key words: APEC strains, resistotypes

Avian colibacillosis is caused by E. coli strains classified in APEC (Avian Pathogenic Escherichia coli) pathotype, starting from the respiratory mucosa. Trigger factors can be viral infections, mycoplasmal infections or micromedium factors that produce immunodepression and destroy the ciliated epithelial cells of respiratory mucosa (2, 3).

APEC strains have as sites of penetration the areas of gas exchange (air bags and lungs) and by the virulence factors, represented by adesines, siderophores, proteins of the external membrane and the complement-resistance, overcome the defense ways of birds causing septicemia and localized infections (2,3).

An important feature of these strains is represented by the resistotypes caused by both types of determinants of antibiotic resistance, respectively plasmid and chromosomal determinants (1, 4).

The research carried out aimed to identify some resistotypes in the APEC strains isolated from broilers of different ages.

Materials and methods

Research has been performed on a number of 121 E. coli strains genotypically and phenotypically classified in the APEC pathotype. The susceptibility to antibiotics was established using difusimetric method (5), using Mueller-Hinton medium with and 11 antibiotics provided by the
companies of production. Interpretation of the results was made according to inhibition zone diameter and data were processed and presented in table 1.

### Table 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Antibiotic</th>
<th>S</th>
<th>I</th>
<th>R</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>1.</td>
<td>Amoxiclav</td>
<td>89</td>
<td>13.6</td>
<td>17</td>
<td>14.05</td>
</tr>
<tr>
<td>2.</td>
<td>Doxycycline</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>9.1</td>
</tr>
<tr>
<td>3.</td>
<td>Tetracycline</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>4.96</td>
</tr>
<tr>
<td>4.</td>
<td>Erythromycin</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Neomycin</td>
<td>3</td>
<td>2.48</td>
<td>6</td>
<td>4.96</td>
</tr>
<tr>
<td>6.</td>
<td>Spectinomycin</td>
<td>13</td>
<td>10.74</td>
<td>29</td>
<td>23.97</td>
</tr>
<tr>
<td>7.</td>
<td>Enrofloxacin</td>
<td>18</td>
<td>14.88</td>
<td>16</td>
<td>13.22</td>
</tr>
<tr>
<td>8.</td>
<td>Norfloxacin</td>
<td>14</td>
<td>11.57</td>
<td>11</td>
<td>9.09</td>
</tr>
<tr>
<td>10.</td>
<td>Florfenicol</td>
<td>116</td>
<td>95.88</td>
<td>5</td>
<td>4.13</td>
</tr>
<tr>
<td>11.</td>
<td>Cosumix</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Results and discussions

_E. coli_ strains unexposed to the pressure of antibiotics are sensitive to these substances, in contrast, strains of _E. coli_ isolated from birds and mammals, in intensive growth system, frequent exposed to antibiotics pressure, present the phenomenon of multiple resistance.

In the investigations were pursued resistotypes in 121 _APEC_ strains isolated from broilers of different ages, in intensive growth system.

The obtained results show that in these strains was revealed the phenomenon of resistance to one or more of the antibiotics used.

Analyzing these results is observed that against to 9 antibiotics, the strains tested were resistant ranged between 61.98% and 100%.

The highest resistance was to erythromycin and Cosumix (100%), followed by the resistance to tetracycline, quinolones and aminoglycosides.

Only 12.40% of isolates tested were resistant to amoxyclove and the phenomenon of resistance has not been observed to florfenicol.

Resistotypes identified in the tested strains, are similar to the mentioned resistotypes, in the _APEC_ strains, by other authors (1, 3, 4).
Resistance development to antibiotics used in the therapy of some infectious diseases in poultry is based on genetic determinants, as plasmid and chromosomal. These determinants govern the synthesis of beta-lactamases with broad spectrum, which induce resistance to penicillin and cephalosporins. Some beta-lactamases are associated with clavulanic acid to remove this effect. Thus, strains tested were resistant to amoxiclav only in proportion of 12.40%, because amoxicillin is associated with clavulanic acid.

Similar mechanisms, as plasmid and chromosomal type, there are also in case of resistance to aminoglycosides, their presence being demonstrated by the resistotypes detected. APEC strains possess a gene chromosomal or plasmid situated responsible for the synthesis of aminoglycoside-acetil-transferase, enzyme that induces the resistance to aminoglycosides.

Resistance to quinolones is a consequence of two mechanisms, one represented by synthesis of DNA girase and another by decreasing of porines number, followed by reducing the external membrane permeability of bacteria. There were detected resistotypes to the 3 quinolones, in varying proportions, in the strains tested.

Also, it was detected a resistotypes to Cosumix (sulphonamide and trimetroprin), governed by genetic mechanism, whose frequency was of 100%.

Resistance to tetracycline and erythromycin also has genetic support of plasmid and chromosomal type, this phenomenon is very common and proven by high frequency of the found resistotypes to these antibiotics.

Resistotypes to the APEC strains are considered epidemiological markers, which should be monitored to survey the movement of APEC strains in poultry.

Conclusions

The profile of multiple resistance to antibiotics has been reported in APEC strains tested, in varying proportions.

The resistotypes identified, genetically determined, correspond to commonly used antibiotics in the therapy of infectious diseases in poultry.

The frequency of these resistotypes requires monitoring and use of them as epidemiological markers associated with other phenotypic and genotypic characters of the APEC strains.

References


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