Antibiogram and Therapeutic Management of Bacterial Otitis Externa - A Clinical Study of 81 Dogs

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Abstract
The present investigation was carried out in 81 clinical cases of otitis externa in dogs presented with symptoms of erythema of pinna, head shaking, ear scratching, mild pain and mild yellowish discharge. The diagnosis was based on clinical signs and confirmed by cultural and biochemical tests. Bacteria isolated from ear swab samples were Staphylococcus sp. (48.6%), Pseudomonas sp. (21.5%), Proteus sp. (14.95%), E.coli (8.41%) and Klebsiella sp. (6.54%). Antibiogram pattern of Staphylococcus sp. revealed highest sensitivity to Amoxicillin-Clavulanic acid (94.23%) and least sensitivity to Penicillin G (11.53%), Pseudomonas sp. revealed highest sensitivity to Amoxicillin-Clavulanic acid (86.95%) and Proteus sp. and Klebsiella sp. showed 100% sensitivity to Cefotaxime whereas complete resistance to Penicillin G and Amikacin were observed for Gram negative bacterial isolates. E. coli revealed highest sensitivity to Cefotaxime (88.88%) and least sensitivity to Penicillin G. All dogs were clinically managed successfully.

Keywords: Antimicrobial susceptibility; bacterial isolation; dog; otitis externa

Introduction
Otitis externa is not a life-threatening disease but can be frustrating for both patients and owners. Otitis externa is an acute or chronic inflammation of external ear. The disease is more frequent in dogs than in cats. Dogs with long pendulous ears are most commonly affected (August, 1988). Ear infections are among the ten most frequent reasons for dogs to be presented to Veterinarians and may affect up to 20% of dogs (Cole, 2004). The clinical management of otitis externa is often annoying because there are many predisposing factors and diseases that cause otitis and many different secondary pathogens that perpetuate the disease process (Rosser, 2004).

Canine otitis externa is very often complicated by combined bacterial and yeast infections. The normal ear canal microflora consists of coagulase-positive, coagulase-negative Staphylococcus sp., B-haemolytic Streptococcus sp., Proteus mirabilis, E. coli, Ps. aeruginosa etc. (Greene, 2006). The present study was employed to isolate and identify the bacteria associated with otitis externa and to determine their antibiogram profile.

Materials and Methods
In mid of March-December 2015 around eighty one (81) ear swabs were collected from dogs irrespective of age, breed and sex with all with clinical signs specific for otitis externa. The swabs were collected aseptically with sterile cotton swabs from external auditory canal and brought for cultural examination and determination of antimicrobial sensitivity pattern. For bacteriological examination, ear swabs were inoculated and in to nutrient agar, sheep blood agar and Mac conkey's agar and incubated at 37\degree C for 24-48 hours for both aerobic and anaerobic conditions. Identification of bacterial isolates were made on basis of cultural, morphological and biochemical parameters (Quinn et al., 2002). The isolates were further subjected to antibiotic sensitivity testing as per Kirby bauer disc diffusion method with commonly available antibiotics (Bauer et al., 1966).

Result and Discussion
Bacteriological examination of sheep blood agar revealed both haemolytic and non-haemolytic colonies. Gram's staining haemolytic colonies revealed Gram positive cocci in clusters and non haemolytic colonies revealed medium sized Gram negative rods. The Gram positive cocci failed to grow in Mac conkey agar, non motile, catalase positive and were identified as Staphylococcus sp. whereas Gram negative rods produced large flat and pale colonies on Mac conkey agar; motile, oxidase and catalase positive were identified as Pseudomonas
and few Gram negative small rods were produced mucoid colonies on blood agar and also in Mac conkey’s agar, catalase positive, oxidase negative and urease positive were identified as Proteus sp. and Klebsiella sp. (Quinn et al., 2002).

Bacterial isolates of eighty one ear swab samples revealed, 52 cases were Staphylococcus sp. (48.6%), 23 cases were Pseudomonas sp. (21.5%), 16 cases were Proteus sp. (14.95%) and 9 cases were E. coli (8.41%) and 7 cases were Klebsiella sp. (6.54%) (Table 1).

The present investigation report that Staphylococcus sp. (48.6%) is the major bacterial isolate of otitis externa which corroborate with study of Selvakumar et al. (2015). 21.5% of Pseudomonas sp. found in chronic cases of otitis externa cases accordance with the findings of Petrova et al. (2013) who also reported that 40% of dogs with otitis have infection with Pseudomonas sp. Most of the workers reported Proteus sp., Klebsiella sp. and E.coli from otitis externa cases from different parts of world (Lakshmi et al., 2013; Petrova et al., 2013; Senthil Kumar et al., 2010).

The antimicrobial sensitivity patterns of bacterial isolates were summarized in Table 2. Staphylococci sp. showed high sensitivity towards Amoxicillin - Clavulanic acid (94.23%), Cefotaxime (84.61%) and Chloramphenicol (82.69%) while intermediate sensitivity to Enrofloxacin (75%), Ciprofloxacin (71.15%) and Ampicillin (65.38%) and found least sensitivity towards Gentamicin (21.15%), Amikacin (17.30%) and Penicillin G (11.53%).

Cefotaxime was found to be 100% effective against almost all isolates of Proteus sp. and Klebsiella sp. The antibiogram pattern of Gram negative bacterial isolates revealed that Enrofloxacin and Chloramphenicol were highly sensitive and showed complete resistance to Amikacin and Penicillin G. This finding was corroborated with the findings of Vikas et al. (2003), Senthil Kumar et al. (2010) and

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**Table 1: Otitis causing bacteria**

<table>
<thead>
<tr>
<th>Bacterial isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus sp. (52)</td>
<td>48.6</td>
</tr>
<tr>
<td>Pseudomonas sp. (23)</td>
<td>21.5</td>
</tr>
<tr>
<td>Proteus sp. (16)</td>
<td>14.95</td>
</tr>
<tr>
<td>E. coli (09)</td>
<td>8.41</td>
</tr>
<tr>
<td>Klebsiella sp. (07)</td>
<td>6.54</td>
</tr>
</tbody>
</table>

**Table 2: Antimicrobial sensitivity patterns of bacterial isolates associated with otitis externa**

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Staphylococcus sp. (n=52)</th>
<th>Pseudomonas sp. (n=23)</th>
<th>Proteus sp. (n=16)</th>
<th>E. coli (n=9)</th>
<th>Klebsiella sp. (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin-Clavulanic acid</td>
<td>94.23</td>
<td>86.95</td>
<td>87.50</td>
<td>77.77</td>
<td>85.71</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>84.61</td>
<td>78.26</td>
<td>100.00</td>
<td>88.88</td>
<td>100.00</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>82.69</td>
<td>78.26</td>
<td>81.25</td>
<td>77.77</td>
<td>71.42</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>75.00</td>
<td>65.21</td>
<td>93.75</td>
<td>77.77</td>
<td>85.71</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>65.38</td>
<td>82.60</td>
<td>93.75</td>
<td>66.66</td>
<td>85.71</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>71.15</td>
<td>21.73</td>
<td>56.25</td>
<td>66.66</td>
<td>71.42</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>21.15</td>
<td>0</td>
<td>43.75</td>
<td>55.55</td>
<td>28.57</td>
</tr>
<tr>
<td>Amikacin</td>
<td>17.30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Penicillin</td>
<td>11.53</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Lodh et al. (2014). Pseudomonas sp. found least susceptibility to Gentamicin (4.34%). It shows irrespective usage of antibiotics leads to complete resistance in field.

**Treatment**

Ear canals of all affected dogs were cleaned with sterile saline solution and were treated with based on antimicrobial susceptibility test results. Amoxicillin-Clavulanic acid 12.5mg/kg b.wt or Cefotaxime 25-35mg/kg b.wt bid daily for seven days and Pomisol® ear drops was applied twice daily for seven days. In addition to antibiotic treatment, few dermatologic conditions in which glucocorticoids are beneficial in the face of concurrent antimicrobial use or sepsis. Glucocorticoids decrease swelling of ear canal and may be key to successful treatment. After a week, all dogs showed marked improvement and reduction in signs of erythema of pinna, head shaking, and ear scratching.

Successful treatment is multifaceted and should include the following steps: 1) identify the primary cause of otitis and manage it, 2) remove the exudate via irrigation of ear canal, 3) identify and treat concurrent otitis media, 4) select an appropriate antibiotic from the results of culture and mean inhibitory concentration on organism and use it at an effective dosage for appropriate duration, and 5) treat topically and systemically until the infection resolves (weeks to months).

**References**


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