Isolation of pathogenic bacteria and antibiotic susceptibility testing of dogs with otitis externa in Aba, Abia state, Nigeria

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Otitis externa is a multi-factory aetiological disease that affects canines. The aim of the study was to isolate bacteria organisms responsible for causing this disease and to determine the antibiotics that could best be used to manage this condition. Forty-eight swab samples were obtained from the ear of dogs that presented clinical symptoms of Otitis externa infection. Bacteriological examination of confirmed positive isolate 42(87.5%) in all was carried out. No isolation was performed on 6 (12.5%) dogs. Among the bacterial organisms isolated, Pseudomonas spp. was the highest 18 (42.9%), followed by Staphylococcus spp. 12(28.7%), Escherichia coli 6(14.3%), Proteus spp. 3 (7.1%), Streptococcus spp. 2(4.2%) and Enterococcus spp. 1 (2.4%).

Antibiotic sensitivity testing carried out on two predominant isolate, Pseudomonas spp. and Staphylococcus spp. show that gentamycin was more sensitive for Pseudomonas spp. 90%, followed by penicillin G 80%, oxofloxacin 60% lincomycin 50% in that order. However, antibiotics like streptomycin, tetracycline, ampicillin and trimethoprim/sulphamethoxazole were resistant to Pseudomonas spp. Similar antibiotic sensitivity response was exhibited by Staphylococcus spp. with gentamycin being the most sensitive 95%, followed by penicillin 90%, lincomycin 75% and oxofloxacin 70%, streptomycin, trimettoprim/sulphamethoxazole, ampicillin and tetracycline were all resistant to Staphylococcus spp.

Key words: Otitis infection, antibiogram, bacteria, canine, Aba.

INTRODUCTION

Otitis externa is a multi-factory aetiology disease that affects canines and could be defined as a chronic inflammation of the epithelium of the external auditory canal, considered the most common disease of the ear canal in dogs (Rosychuk, 1994).

The auditory canal of dog is an environment vulnerable to change; physiologic and anatomic alterations which can trigger off the development of a niche which favours proliferation of microorganisms (Logas, 1994; Gothelf, 2000). The most common causes directly inducing otitis externa are contact allergies, food hypersensitivity, flea bite allergy, foreign bodies, autoimmune related disease and keratinazation disorders (Carlotti, 1991; McKeever, 1996). Miscellaneous causes include juvenile cellulitis, idiopathic inflammatory Otitis externa and eosinophilic proliferative Otitis. Among the secondary causes there are bacteria (Bornand, 1992).

Microorganisms are seen as perpetuating factors as they are responsible for the aggravation of the process. Organism commonly isolated from dogs suffering from otitis externa are Proteus spp, Escherichia coli, Staphylococcus spp, Pseudomonas spp, Klebsiella spp.
Pseudomonas spp. (August, 1988; Peterson, 2002).

In most previous studies, the antibiotic susceptibility of the microorganism in dogs with otitis externa vary; (Cole et al., 1998; Hariharan et al., 2006; Martin et al., 2000) The prevalence and aetiological agents of otitis externa vary depending on the geographical area. The study was aimed at isolating pathogenic bacteria from dogs with otitis externa, assess the incidence of the microorganisms in dogs considering age, breed and season of the year, and to determine the susceptibility to antibiotics.

MATERIALS AND METHODS

Fouty eight dogs was analysed for Otitis externa from different private veterinary clinics in Aba, Abia State South – East of Nigeria were studied from October 2013 to September 2014. Samples were taken from dogs with sterile swab before treatment commenced on the dogs. There were different breeds of dogs that were sampled. They include: Local breed (Mongrel), Rottweiler, Doberman, German shepherd and Cross breed, offspring of a local breed and any of the exotic breed).

The samples were collected from the horizontal portion of the external ear canal with swabs soaked in sterile physiological saline solution. The samples were then taken to the veterinary laboratory for processing.

Isolation of microorganisms was carried out using MacConkey agar (Difco); while nutrient Broth and Mueller Hinton agar was used for passage of microorganism and antibiotic susceptibility test (Difio). The swab samples were streaked in MacConkey agar plates and the plates were incubated at 37°C in aerobic conditions for 24 h.

The plates were examined for the presence of bacteria growth. The plates were further examined up till the third day because of microorganisms that grow slowly. The bacteria isolate were classified based on morphology, cultural and biochemical features or characteristics (Quinn et al., 1994). The isolate bacteria that had dominant presence in a plate by way of more growth in a mixed culture were considered very significant and hence responsible for causing the infection.

The antibiotic sensitivity test was carried out using disk diffusion (Oxoid) containing 8 different antibiotic types among which are: gentamycin (10 μg), streptomycin (10 μg), ampicillin (10 μg), oxfloxacine (5 μg), lincomycin (15 μg), penicillin G (10 μg), tetracycline (30 μg), trimethoprium/sulphurmethoxazole (25 μg) (Bauer et al., 1966)

The zone of inhibition above 20 mm in diameter was classified as sensitive(S) while those that are 0 – 18 mm were classified as resistance (R). There were no considerations for intermediate or moderate sensitivity. The result interpretation was based on the criteria of the clinical and laboratory standards institute (CLSI, 1999)

Antibiotic susceptibility testing of the two dominant isolated microorganism, Pseudomonas spp. and Staphylococcus spp. was carried out and Figures 1 and 2 shown the results obtained.

RESULTS AND DISCUSSION

Bacteriological study

The July to September quarter presented the period with the highest Pseudomonas spp. (10 Isolated), while 7

![Figure 1. Antibiotic susceptibility testing of Pseudomonas spp. isolated from dogs with otitis externa.](image-url)
isolates of *Staphylococcus* *spp.* was isolated in the same period. This showed those months of heavy rain in Nigeria (July - September). The highest incidence of bacterial infection with a total of 24 (57.1%) occurred in the third quarter out of the four quarters that make up a year.

Dogs of age's 1 – 11 months recorded the highest incidence of bacteria causing otitis externa. 27(64.2%) as shown in Table 1. German shepherd breed of dog recorded the highest occurrence of bacteria organism.

Out of the 48 ear swab samples that was taken from dogs with Otitis externa, 6 of the samples (12.5%) was not processed while 42 (87.5%) was processed and different types of Gram negative and Gram positive bacteria were isolated among, which one: *E. coli* 6(14.3%), *Enterococcus* *spp.* (2.4%), *Staphylococcus* *spp.* 12(28.7%), *Streptococcus* *spp.* 3(7.1%), *Proteus* *spp.* 2 (4.2%) and *Pseudomonas* *spp.* 18 (42.9%). The most dominant Gram negative bacteria was *Pseudomonas* *spp.* while *Staphylococcus* *spp.* was the most dominant Gram positive bacteria isolated as shown in Table 2.

Antibiotic susceptibility testing of *Pseudomonas* *spp.* Figure 1 showed that gentamycin was the most sensitive 90% and penicillin 80% while the most resistant was trimethoprim/sulphurmethoxazole 50%. Similar result was obtained for sensitivity test of *Staphylococcus* *spp.* with gentamycin 95% being the most sensitivity and followed by penicillin 90% while the most resistance is ampicillin 20%.

Otitis externa infection in dogs has become a problem among dogs in Aba, Abia State, and South-East Nigeria. The need to find out the bacteria organisms responsible for causing this infection and establish the antibiotic that is most sensitive to this organisms in dog infection and
eliminate indiscriminate use of antibiotics without recourse to drug resistance.

The findings of this study showed that Otitis externa infection occurred more in dogs of between the ages of 1 - 11 months. This may not be unconnected with the fact that German shepherd breed has a lot of long hair which partly covers parts of the ear and this is in agreement with the finding of Duchá et al. (1981). However, the highest incidence of Otitis externa infection in the study is those of 1 – 3 years of age. The reason for this may not be very clear, however, hearse environmental factors in a tropical country like Nigeria may explain the reason for increase incidence in raining season than dry season.

The occurrence of Gram negative bacteria in Otitis externa infection in dogs in the study corresponds to previous study of Harirhan et al. (2006).

In this study, most frequently isolated bacteria were Pseudomonas spp. and Staphylococcus spp., this agrees with the work (Carlotti, 1991; McKeever, 1996).

The infected dogs with Otitis externa manifested clinical signs of head shaking, purulent secretions, pain on touch of the ear, pruritis and increased secretions.

Similar findings were reported (August, 1988). The study showed that gentamycin response was 90% and 95% for Pseudomonas spp. and Staphylococcus spp. respectively, and this report is similar to the finding of (Schick et al., 2007). This two organisms Pseudomonas spp. and Staphylococcus spp. were resistant to tetracycline, ampicillin and trimethoprim/sulphamethoxazole and this report is in agreement with (Martin et al., 2000).

This findings indicate that the antimicrobial sensitivities of the bacteria isolated from dogs with Otitis externa are variable. The use of antibiotics for treatment of Otitis externa should be based on bacteria culture and sensitivity tests.

Conclusion

In dogs with Otitis externa infection, the more frequently isolated bacterial is Pseudomonas spp. The ages of dogs affects the incidence of Otitis externa. Also, Otitis externa is more sensitive to antibiotics; gentamycin and penicillin while the most resistant is ampicillin and tetracycline.

Table 2. Quarterly occurrence and rate of bacterial isolated from otitis externa in dogs.

<table>
<thead>
<tr>
<th>Isolated Microorganisms</th>
<th>No. Isolated %</th>
<th>(Jan - Mar)</th>
<th>(April - June)</th>
<th>(July – Sept.)</th>
<th>(Oct - Dec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>6 (14.3%)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>1 (2.4%)</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>12 (28.67%)</td>
<td>-</td>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>3 (7.11%)</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Proteus spp.</td>
<td>2 (4.27%)</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Pseudomonas spp.</td>
<td>18 (42.96%)</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>42 (99.6%)</td>
<td>2</td>
<td>11</td>
<td>24</td>
<td>(57.1%)</td>
</tr>
</tbody>
</table>

REFERENCES


