



Antimicrobial Sensitivity of *Pasteurella Dagsmatis* and *Pasteurella Caballi* Isolates from Ocular and Nasal Infections in Horses

Bhoj Singh

Indian Veterinary Research Institute Izatnagar Bareilly Uttar Pradesh INDIA

Abstract

Pasteurella infections in horses are not frequent and only a few *Pasteurella* have been reported causing infection in horses. *Pasteurella* rarely causes any fatal infection in horses but in association with other bacteria or virus may be problematic. Since March 2011 to September 2017 we encountered only two cases where *Pasteurella* strains could be detected. In one case horse with conjunctivitis and ocular discharges had mixed infection of *Pasteurella dagsmatis* and *Streptococcus equi* ssp. *zooepidemicus*, and in another case of strangles, *Pasteurella caballi* could be isolated along with *Streptococcus equi* ssp. *equi*. In both, the cases *Pasteurella* isolates were sensitive to most of the commonly used antibiotics. Both the cases were cured after strepto-penicillin treatment.

Keywords: *Pasteurellosis*, *Pasteurella* infection in horses, *Pasteurella dagsmatis*, *Pasteurella caballi*, *Streptococcus equi*, *Enterococcus solitarius*, Herbal antimicrobials, Antibiotic Sensitivity, Herbal drug sensitivity.

1. Introduction

Pasteurellosis or *Pasteurella* infections in horses are not common and *Pasteurella* isolates have

sometimes been reported to be the cause or causal factor in respiratory tract infections in association with other bacteria having potential pathogenicity (Wood et al., 1993; Hayakawa et al., 1993, Derksen, 1993). Here, one ocular and other upper respiratory tract infection case associated with *P. dagsmatis* and *P. caballi* infection, respectively have been described.

2. Materials and Methods

From Veterinary Polyclinic of the Institute ocular swab was received for identification of bacteria and antibiotic sensitivity testing (ABST) on 23 July 2011. In another case, nasal swabs from a young horse, with clinical signs of strangles, was received on 23 August 2017. The swabs were inoculated on to sheep blood agar plates in duplicate and incubated at 37C for 24 h. The isolated colonies were picked and identified using standard biochemical, growth and culture characteristics (Markey et al., 2013; Singh, 2009). The antimicrobial sensitivity of the selected isolates was determined using disc diffusion assay on the suitable medium as described by Singh 2013 following

CLSI standards. The sensitivity of isolates was determined against herbal as well as conventional antimicrobials.

Pasteurella isolates were submitted to *Pasteurella* Reference Laboratory, Division of Bacteriology, IVRI, Izatnagar for confirmation of the species of the isolates.

3. Results

From Ocular swabs *Pasteurella dagsmatis* was isolated along with *Streptococcus equi* ssp. *zooepidemicus*. Both of the isolates were resistant to the essential oil of *Ageratum conyzoides*, *Xanthoxylum rhetsa*, *Eupatorium odoratum*, Patchouli, Sandalwood, Agarwood but sensitive to *Carvacrol*. Both of the bacteria were also sensitive to ampicillin+sulbactam, tetracycline, gentamicin, ciprofloxacin, nitrofurantoin, chloramphenicol, and erythromycin while resistant to cotrimazine, and nalidixic acid. *Pasteurella dagsmatis* strains was resistant to ampicillin and amoxycillin while *S. equi* ssp. *zooepidemicus* strain was sensitive to both of the drugs.

A total four types of bacteria including *Pas-*

teurella caballi, Streptococcus equi ssp. equi (both in large numbers), Streptococcus milleri and Enterococcus solitarius. All the strains were sensitive to essential oils of ajowan, betel leaves, thyme, cinnamon, holy basil, lemon grass but none to essential oil of agarwood. Carvacrol, cinnamaldehyde and citral (1 mg/ml) inhibited the growth of all the four strains. Guggul oil and sandalwood oil failed to inhibit the growth of P. caballi and S. equi only while gum acacia, and essential oil of patchouli inhibited both the strains, the results for these herbal antimicrobials were opposite for S. milleri and E. solitarius strains. Most of the antibiotics inhibited growth of all the four strains isolated from strangled horse including ampicillin, amoxicillin, tetracycline, gentamicin, nitrofurantoin, cotrimoxazole, ciprofloxacin, chloramphenicol, ceftazidime, meropenem, erythromycin, cefotaxime, tigecycline, ceftriaxone, ceftiofur, cefepime, and piperacillin. Aztreonam, azithromycin, cefixime, colistin and penicillin were effective only on S. equi and P. caballi strains.

4. Discussion

Pasteurella strains have mostly been reported in mixed culture from horses and seem to be not the pathogens of very importance (Wood et al., 1993; Hayakawa et al., 1993, Derksen, 1993). In both the cases reported here Pasteurella were isolated with other bacteria but both the samples being from open orifices have a probability that other

bacteria (common in horses) might be just contaminants and Pasteurella strains might be more important cause of the pathology. The P. dagmatis and P. caballi isolation from horses have been reported earlier (Wood et al., 1993; Hayakawa et al., 1993, Derksen, 1993) also but antibiotic and herbal drug sensitivity pattern has rarely been reported. Sensitivity of P. dagmatis, as well as P. caballi to most of the antimicrobials, indicated that either the horses have rarely been exposed to antibiotics (however, it does not seem to be true as antibiotics are commonly used in horses in India and drug resistance is common among bacteria isolated from horses, Singh, 2009, Singh et al., 2010) or Pasteurella of these two species are mostly drug sensitive (not known yet) or emergence of drug resistance is rare in Pasteurella strains. The study on more strains of these pasteurallae can only reveal the facts.

References

- [1] Derksen FJ, "Chronic obstructive pulmonary disease (heaves) as an inflammatory condition", Equine Vet J., Vol. 25, No. 4, 257-258, 1993.
- [2] Hayakawa Y, Komae H, Ide H, Nakagawa H, Yoshida Y, Kamada M, Kataoka Y, Nakazawa M., "An occurrence of equine transport pneumonia caused by mixed infection with Pasteurella caballi, Streptococcus suis and Streptococcus zooepidemicus.", J Vet Med Sci., Vol. 55, No. 3, 455-456, 1993.

- [3] Markey B., Leonard F, Archambault M, Cullinane A, Maguire D., "Clinical Veterinary Microbiology", 2nd Edition, Vol. , No. , 920, 2013.
- [4] Singh, B.R., "Labtop for Microbiology Laboratory", . ISBN 978-3-8383-1574-40, Vol. , No. , , 2009.
- [5] Singh, B.R., "Prevalence of vancomycin resistance and multiple drug resistance in enterococci in equids in North India", Journal of Infections in Developing Countries, Vol. 3, No. 7, 398-403, 2009.
- [6] Singh, B.R., "Thermotolerance and multidrug resistance in bacteria isolated from equids and their environment: source of pasteurization resistant bacteria", Veterinary Record, Vol. 164, No. , 746-750, 2009.
- [7] Singh, B.R., Chauhan, M., Sindhu, R.K., Gulati, B.R. Khurana, S.K., Singh, B., Yadav, H.S., Yadav, R.P., "Diseases prevalent in equids in India: A survey of veterinary practitioners", Asian Journal of Animal and Veterinary Advances, Vol. 5, No. 2, 143-153, 2010.
- [8] Singh, B.R., "Antimicrobial sensitivity assay and antimicrobial chemotherapy in Animals: A Practical approach.", Diseases of Animals: Diagnosis and Management, Vol. , No. , 7-31, 2013.
- [9] Wood JL, Burrell MH, Roberts CA, Chanter N, Shaw Y., "Streptococci and Pasteurella spp. associated with disease of the equine lower respiratory tract.", Equine Vet J., Vol. 25, No. 4, 314-318, 1993.